

MARGINAL FARMERS AND OPTIONS FOR IMPROVING THEIR LIVELIHOOD: A STUDY IN UTTARANCHAL

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Small & Marginal farmers
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PREFACE

The farming activities, including animal husbandry form the economic base and the main source of livelihood and employment in rural areas of Uttaranchal. However, increasing population coupled with decreasing arable land per farm household partly due to increasing fragmentation of land holdings and partly due to increasing landslides, soil erosion, decreasing natural resources required to sustain farm productivity and the decreasing quality of lands due to increasingly scarce water for irrigation have increased the problems of employment and sustaining the livelihood of farming households, particularly for tiny farm holders. The creation of productive employment opportunities according to the volume of labourforce have been increasing and the generation of income to sustain the livelihood of farm households through carrying out large scale diversification and modernisation of economic system by way of initiating industrialization and large scale production system is also restricted by a number of environmental and ecological constraints. In such circumstances, initiating diversification and commercialisation of agriculture becomes a strong case and a most important policy objectives for hill areas like Uttaranchal.

In this context, the present study has been centered around to examine the possibility of initiating diversification in farming system through developing an appropriate and environmentally feasible land use pattern under different cropping system such that the per hectare productivity and returns from scarcely available arable land could be maximised and the extent to which the concerned option could be useful for creating additional productive employment opportunities and improving the livelihood situation of farming households on a sustainable basis in different geographical locations of the State. Moreover, the study is presented in eight chapters. Chapter one deals with scope, objectives and methodology of the study. Issues related to marginality of farms and the marginal farms have been discussed in chapter two. Chapter three presents the structure of animal husbandry. Emerging changes in cropping pattern, production and productivity have been presented in chapter four. Analysis on income and employment perspectives in agricultural diversification has been undertaken in chapter five. Chapter six deals with pattern and arrangements of marketing while chapter seven deals with the perspectives and planning for agricultural diversification. The chapter eight provides the concluding remarks of the study and present some suggestions for policy recommendations.

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CHAPTER I

INTRODUCTION, SCOPE AND METHODOLOGY OF THE STUDY

Agriculture and its associated activities continued to have been forming the economic base and a major source for providing employment opportunities to the rural labourforce and the avenues of income for sustaining the livelihood of rural households in India for last several centuries. However, over the years, unprecedently increasing trend of population pressure on land both for employment and livelihood and resulting an ever declining rate of land – man ratio, increasing fragmentation of agricultural holdings and inequalities in the distribution of arable land for cultivation among farming households, decline in per household income being originated from farming system and increasing application of labour saving farm production technologies, the agriculture sector has been recognized would hardly be in a position neither to provide gainful employment opportunities at the level the rural labourforce has been increasing nor to sustain the livelihood of rural households.

It has also been believed that even a relatively rapid growth of agriculture is unlikely to employ the entire rural labourforce at reasonable levels of productivity and incomes. Agricultural growth in such situation should be more than the growth of population, accounting at the same time for the fact that the technological progress that is required for achieving high rate of growth may reduce the elasticity of employment to output much below unit (Papola, 1984). Even in a situation of bringing appropriate technological advancement in agriculture, the rural labourforce can not be employed fully in this sector in developing countries, especially in land scarce regions (Islam, 1987). More explicitly, Mahajan (2003) also argued that even in the high growth and agriculturally potential regions, the scope for further development in agriculture sector so as to create additional employment opportunities seem to be tapping off. Such possibility becomes rather more crucial and abundant in agriculturally under-developed regions and hilly areas where arable land for cultivation is very limited.

Such seriously emerging problems as are arising in the creation of employment opportunities according to increasing level of labourforce and the generation of income to sustain the livelihood of rural households, both in agriculturally potential and non-potential regions is expected to be reduced to a certain extent through bringing certain changes in traditional farming system and the land use pattern. The methodologies to be initiated in the context of

changing land use pattern refer to the utilization of available land in such an alternative options which may derive maximum economic benefits to the owners of land. In this direction the available land could be used for the production of high value crops instead of using it for growing traditional crops in which per hectare productivity and returns are rather low. Undertaking such changes in land use pattern and thus initiating diversification in farming system could possibly be a instrumental approach for achieving increasing per hectare farm productivity and incomes on one hand and maximising per farm household incomes on the other in both the categories of agriculturally potential and non-potential regions and hill areas. Similarly it should also be clearly understand the fact that the diversification of agriculture and more appropriate land use pattern would no doubt lead to the development of land based activities on a more sustainable basis and would certainly bring an improvement in economic condition of farming households by way of enhancing per hectare productivity and returns but it might not provide additional employment opportunities to the increasing labourforce.

However given a very small size of land holdings available for cultivation with a majority of farming households the process of initiating crop diversification needs to be highly centered around to encourage these small farm holds achieving its overall in view of favourable impact on raising per household income and productive employment opportunities.

Moreover, planning for initiating simultaneous diversification of both farm and non-farm sector economies together could also be another important options for creating additional employment opportunities for increasing labourforce and incomes to sustain the livelihood of rural households. Since the gaining importance of various non-farm activities, both for the generation of income and employment in various regions of the country has been well visualised by the studies undertaken during the recent past (Krishnamurthy, 1974; Chadha, 1994; Eapen, 1994; Singh, 1993 and Chadha, 2002). Declining significance of farm sector and increasing importance of non-farm sector in rural economic system can be clearly seen in terms of decreasing concentration of rural labourforce on agricultural and its associated activities as the consequence of its increasing shift into non-farm sector over the years, especially after mid-sixties. However, a significant level of variations is prevailing in such shifting pattern of labourforce into the non-farm economies among different states. It has further been recognized that the shift of workforce from farm sector to non-farm sector is greatly taking place in areas where the workforce was already confined largely in farm sector as compared to areas where the workforce was earlier largely concentrated in non-farm sector (Visaria, 1984 and Basant, 1982).

Similarly, the income generated from primary sector, consisting agriculture and its allied activities, is steadily declining while the respective share of both secondary and tertiary sectors is significantly increasing ever since the planning era in rural areas of India (Chadha, 1993). In

addition, both the productivity and value-added per worker in agriculture sector are constituting relatively at much lower level than in secondary and tertiary sector of economies (Papola, 1992).

On the whole, initiating diversification either in the farm sector or in the non-farm sector alone would be any appropriate measure for achieving to absorb the increasing labourforce gainfully and create the opportunities of livelihood for rural households on sustainable basis. What would be the more suggestive option for meeting out the concerned challenges is to initiate for developing a comprehensive planning strategy for integrated development of farm and non-farm sectors. The fact also is that the diversification and commercialisation of agriculture sector economies are assumed to positively influence the expansion and growth pattern of various non-farm activities in general and manufacturing activities in particular. The findings of a large number of studies are that there is a positive relationship between the growth of agricultural productivity and non-agricultural employment across the regions of the countries (Unni, 1991; Jayraj, 1989; Mahendra Dev, 1990). Considering such a strong relationship providing between the growth of agricultural productivity and the expansion of non-farm activities it has to be considered into account that initiating diversification in agriculture will positively be beneficial in improving the efficiency of different product groups of agro-based units and in their further expansion in agriculturally potential regions than in agriculturally backward and low growth regions. But the problem of unemployment and poverty has been largely increasing in later categories of regions as compared to former one.

In such circumstance the diversification and commercialization of agriculture becomes a strong case and a more important objective of policy in especially favour of agriculturally backward regions such as hilly areas, where arable land for cultivation is very scarce. In addition, carrying out a large scale diversification and modernisation of economic system through initiating industrialisation and large scale production system is severely limited in hilly and mountainous areas because of a number of factors such as the limited environmentally sensitive resource base, their spread of usable resources across different and in accessible areas, inaccessibility to markets and modern inputs and technology, deficient infrastructure and high transport costs leading to non-competitiveness of products (Mehta, 1996). Considering these basic constraints as imposed by the nature on undertaking large scale economic diversification in the state and the availability of a small size of land for cultivation with a majority of farming households the focus of the present study has been centered around to examine the possibility of initiating diversification and commercialisation in farming system through developing an appropriate and environmentally feasible land use pattern under different cropping system such that the per hectare productivity and return from scarcely available land could be maximised and to what extent the concerned option could be useful for creating additional employment opportunities and improving the livelihood of farming households on sustainable basis in different geographical locations of Uttaranchal.

The Uttarakhand State, comprised of thirteen districts, Nainital, Dehradun, Udham Singh Nagar, Haridwar, Almora, Pithoragarh, Bageshwar, Champawat, Rudrapur, Uttarkashi, Tehri, Chamoli and Pauri Garhwal, is situated in the Central Himalayan Zone. The State, dominated largely by hilly and mountain areas, continues to remain one of the most under-developed States of India. The total geographical area of Uttarakhand is 53.5 thousand square kilometres. The topography of the State is characterised by deep valleys, high peaks and wide variety of vegetation, this variety is principally due to altitudinal variations. Elevations extend from approximately 300 to 7000 masl. The temperature ranges from 16° to 40°C, but it drops below freezing point in many parts of the State during winter.

According to 2001 Census, the population of the State was 84.8 lakhs, consisting 43.2 lakhs males and 41.6 lakhs females. The literacy accounted for 72.3 per cent, 84 per cent among males and 60.3 per cent among females, which is comparatively much higher than it is recorded for its parent State Uttar Pradesh and at national level figures of 57.36 per cent and 65.38 per cent respectively. The State is sparsely populated, having a density of 159 persons per square kilometre compared to 324 persons at national level and 689 persons in Uttar Pradesh. The annual growth rate of population during the period 1991 to 2001 was 1.9 per cent, which, in fact, has been consistently declining over the years. As the corresponding annual growth rate of population was 2.65 per cent during 1971 to 1981, which dropped to 2.26 per cent during 1981 to 1991. Even the trend of population growth in Uttarakhand had remained considerably at lower level as compared to country as a whole during the last different Census years. The peculiar demographic feature of the State is that the population of female constitute relatively higher than the case of male population and the female population has been increasing at a faster rate than the male population in rural areas, but the situation is reversal in the case of urban areas. The workforce makes up around 37 per cent of the total population, 46.41 per cent for males and 27.09 per cent for females. However the overall the workforce participation rate increased marginally for both men and women but it has increased from 25.62 per cent to 27.09 per cent for women compared to a decline from 46.60 per cent to 46.41 per cent in the case of men during the period 1991 to 2001.

The agriculture and allied activities constitute the economic base and as the major source of livelihood and employment of the people in the State. Of the total labourforce employed in different economic activities, around 58 per cent of labourforce comprising 44 per cent among men and 84 per cent among women are alone engaged in different agricultural activities. Further, accounting only for the commodity producing sectors, agriculture (including animal husbandry and fishery) contributes about 67 per cent, manufacturing activities 20.08 per cent, forestry and logging 8.78 per cent and mining and quarrying 4.2 per cent to the net domestic output of Uttarakhand. The short-term trend in the contribution of income being generated from

agriculture suggests that the dominance of agriculture is increasing; its share in NDP increased from 64 per cent to 67 per cent during last decade but the share of primary sector as a whole has substantially declined due to sharp decline in the share of forestry and logging.

Across the district level of the State, the dominance of agriculture sector has also been well visualized in terms of its share in total NDP derived from different commodities producing sector in each of the districts with a marginal variations, ranging highest at 83 per cent in Tehri Garhwal to lowest at 55 per cent in Uttarkashi. Dependency of labourforce upon the agricultural activities for employment is also quite significant in all the districts. But the concentration of workforce in agriculture sector has been reflected relatively at lower extent in case of purely hilly districts as compared to districts those fall in the plains. The districts confined in the plains include Udham Singh Nagar and Haridwar while a part of area of districts Nainital and Dehradun falls in the plains and remaining are the purely hilly districts. The proportion of workforce engaged in agricultural activities accounted for highest at 81.02 per cent in Uttarkashi to lowest at 25.65 per cent in Dehradun.

However, the dominance of agriculture sector has been recognized losing its ground in terms of both creating employment opportunities and originating income during the recent past in the State. The emerging situation is that the per capita NDP generated from this sector has been consistently declining for last couple of decades. Its direct consequences have been that the concentration of labourforce in agricultural activities has been subsequently declining and its shift into non-farm activities, especially in tertiary sector of economies has been consistently increasing over the years. In all, around 42 per cent of the total workforce, comprising 56 per cent men and 16 per cent women workforce are engaged in different non-farm activities. It has further been reflecting that the concentration of workforce in productive economic activities such as primary and secondary sectors has been narrowing down and its shift has been subsequently increasing in tertiary sector of economies, particularly in informal sector economies and services in different districts (Mehta, 1999). Accessibility to non-farm employment seems to be fairly larger in districts which are confined in plain areas as compared to purely hilly areas. It may also be noted that former categories of districts are relatively much developed as compared to latter one by virtue of the availability of highly fertile and productive agricultural land and the concentration of major industrial enterprises. To a certain extent, the labourforce residing in former groups of districts have greater advantages and options in terms of finding productive employment opportunities both in farm sector and non-farm sector while the labourforce confined in hilly districts are forced to engage in their traditional farming operations and to a little extent into very low paid occupations available in non-farm economy. It is, therefore, the concentration of workforce in non-farm sector revealed at fairly larger level in plain districts such as Dehradun (74 per cent) and Haridwar (58 per cent) as compared to districts confined in hilly areas where it has been ranging highest at 32 per cent in Pithoragarh to lowest at 19 per cent in

Uttarkashi. But, over the years, the non-farm employment has been increasing at a faster rate in later groups of districts as compared to former one (Mehta, 2003). It indicates the fact that the shift of workforce from farm to non-farm sector is greatly taking place in areas where the workforce was largely confined in farm sector as compared to those areas where the workforce was already largely concentrated in non-farm sector (Bhattacharya, 1986; Kabra, 1992).

Between the period 1991 and 2001, the growth pattern of non-farm employment has been as high as 8 per cent in Tehri Garhwal followed by 6 per cent in Chamoli and at lowest level of around 5 per cent in Pauri Garhwal while among the districts confined in plain areas the corresponding figure of growth rate accounted highest at 5 per cent in Dehradun followed by 4 per cent in Nainital and lowest at about 2 per cent in Haridwar. Also, like in other parts of the country the non-farm employment has shown at least some level of growth in each of the districts of the State during last decade which trend may call an index of economic development taking place in all the districts (Krishnamurthy, 1982; Visaria, 1984; Basant, 1982).

The concerned emerging situation of increasing shift of workforce from farm to non-farm sector economies provides an impression that the farming households have been not in a position to generate adequate income from the farm sector for sustaining their livelihood mainly due to decreasing availability of per household land for cultivation. As a result the rural labourforce has been increasingly opting to engage in non-farm activities so as to originate income for their households. In fact, the contribution of income originated from non-farm sector in the total income of rural households is accounted fairly larger at 67 per cent, though it varied significantly for households located in different geographical locations. Annually per household income being generated from this concerned sector is estimated to be Rs.18.5 thousand while the per worker yearly earnings accounted for Rs.12.48 thousand. On the other hand, the farm sector has been observed providing a very low amount of per worker income at Rs.2.09 thousand (Mehta, 2004). Thus, considering into account the increasingly gaining importance of non-farm economies in providing additional employment opportunities and originating income for the rural households, it can be argued that developing a comprehensive planning strategy towards the promotion and expansion of potential non-farm activities could be one of the most instrumental option for improving the livelihood situation of rural households and to meet the challenges of unemployment and poverty in the State. At the same time, it should also be accepted the fact that expansion of non-farm sector employment could be possible to a certain extent in such an under-developed State where neither the backward or the forward linkages conducive to the expansion of different non-farm activities are developed nor the available fragile ecological and environmental system, coupled with inaccessibility situation and poorly developed infrastructural facilities are permitting the scope for undertaking large scale diversification of economic system.

In this regard initiating diversification and commercialization of agriculture is accepted would possibly be a more appropriate option both for increasing the per household income as well as for achieving the expansion and growth of different non-farm activities in general and especially of agro-based enterprises in the product lines such as diversified farm products, fruits, off-seasonal vegetables, tea, honey, milk, meat, wool and woollen products and so on. In stead, initiating for integrated development of farm and non-farm sector along with developing necessary infrastructural facilities for achieving simultaneous growth of both sectors could bring out improvements in the livelihood situation of farmers and reduce the increasing problems of unemployment and poverty to a certain level in the State.

The emerging problem related to agriculture in hilly and mountain areas of the State are the increasing fragmentation of holdings resulting largely increasing trend in the numbers of marginal and small farmers, availability of terraced fields, unprecedented decreasing pattern in arable land, partly due to increasing pace of urbanisation and partly due to increasing land slides, soil erosion and depletion of natural resources and increasing water scarcity for irrigation of farms. As a result of these factors, adoption of traditional farming system with using available land largely in the production of low value and traditional crops have created the problem of sustaining the livelihood of farming households, particularly of marginal farmers. Consequently, the value of agricultural produce becomes very low as compared to the aggregate cost of production. It is, thus, appeared that the average hill family gets around seven months of subsistence in terms of food from its holding (Ashish, 1981) and its contribution in the income of farming households accounted for nearly 32 per cent (Mehta, 2002). These findings are further substantiated by Pokharyal (1993), who argues that despite their best efforts the hill farmers are not in a position to produce enough foodgrains to meet their domestic consumption requirements. Pokharyal further points out that 90.67 per cent of the farmers do not use improved farm technology, which ultimately is the reason for the low productivity.

THE ISSUES

Since the pressure of population has been unprecedently increasing on farming activities both for employment and sustaining their livelihood, in spite of the fact that the concerned sector has been providing employment to over half of the existing labourforce in the State and contributing at least a part of income in almost of the rural households. However, the capacity of farm sector to create additional productive employment and income for households is largely lacking due to already explained factors and limitations imposing low per worker or per acre productivity rates and unsustainable income to the farm households.

Thus, in order to overcome from the problem of low productivity of land, it shall be desirable to have a comprehensive land use planning based on the classification of land and its usefulness for growing different food crops, vegetables, fruits and related non-food crops.

Inclusion of land to be used for forestation so as to sustain the environmental situation should also be provided priority. As the existing land use pattern and its management have aggravated the problem of environmental degradation, resulting not only in decreasing overall productivity of land but also its gradual destruction by floods, land slides and diversification through soil erosion. It would be essential that the tree and vegetative cover on the slopes is expanded in order to conserve the fast depleting topsoil in the hilly areas. The topography is such that erosion becomes severe when the land is laid bare for long periods, which is essential in annual crop farming particularly during cereal cultivation. For this reason the hill areas of the State are more suited to tree crops, plantation and horticultural activities which destroy the soil to the least degree. Often land is put to wrong uses, without a proper consideration of slope and improper terracing which accelerates erosion, run-off and hence the degradation process. Unscientific uses that the land is put without visualising its implications, viability to produce particular food and non-food crops has resulted in low productivity of crops.

Issues related to land use pattern and land management has, therefore, been cited a very important subject of policy concern for mountain areas (Banskta, 1983). In this context, the obvious objective of a land based planning exercise is to allocate the available land for alternative uses and to maximise per hectare returns and productivity of land (Shah, 1986). At the same time, efforts must also be made to identify specific farming options which will be environmentally sustainable (Pratap, 1999). Thus, the concept of appropriate land use planning and management should centered out on the objective approach of a basic shift of available land from the production of low value food crops to those of high value crops in consonant with the environment and ecology of concerned geographical locations of the State. In effects, it should aim at: (i) a shift in pattern of the use of land already under cultivation; (ii) greater emphasis on vegetables and horticulture; (iii) productive use of deforestate land; and (iv) development of grass lands and pastures to support a more productive animal husbandry sector (Mehta, 1996).

CLASSIFICATION OF LAND

In this above context, it is also essential to carry out a proper analysis of the capability of land for the production of different high value crops, including fruits and vegetables across different areas and watersheds. In the past, several concepts and methodologies for land capability classification in mountain areas have been developed. The studies by Khybri, (1948) and Hudson, (1979) have recommended for dividing land in Uttaranchal into different classes according to its depth and texture of soil, the stone-soil ratio, slope of land, and erosion status. But these methodologies are not of much use for practical and operational point of view, especially at formulating the watershed development plans. Kango (1979) also considered the existing methodology for land classification not of much value for mountain areas. He considered types of erosion, slope of land, characteristics of vegetation and types of land uses

and correlated these parameters to develop a table of soil erosion intensity classes in ascending order of magnitude. The forest department is also following erodability characteristics of land. Perhaps these all methodologies largely tell about the conservation measures needed for the various classes of land to avoid the risk of soil-erosion and finally using different classes of land for certain alternative options. However, the obvious concern of the present study context is to increase the production and productivity of land in each use on a sustainable basis. From this point of view, Shah (1983) argued that a more practical methodology would be the classification of arable land into irrigated and non-irrigated. The irrigated land can be further classified in *Seras* (perennially irrigated), *Pechal* (intermittently irrigated) and watershed. The classified land in these two categories must be used for producing identified crops to be grown in respective quality of land.

More specifically, for the purpose of present study, a simplest methodology would be the categorisation of land into two groups, *talaon* and *upraon*, the former being relatively flat with fertile soil and endowed with water for irrigation, and the latter sloping land with high stone contents and without any means of assured irrigation (Mehta, 1997). Presently the *talaon* land in the State is mainly used for the production of wheat during Rabi and paddy during Kharif crop season, with some land used for growing pulses, oilseeds, and vegetables. The *upraon* land is used for the purpose of growing low value crops such as bajra, mandua and sawan, mainly during the rainy season. On the *talaon* land, technological improvements through application of modern inputs would be an appropriate strategy for increasing per hectare productivity.

REGIONALISATION APPROACH

In a situation of extremely larger differences existing in the suitability of land in using it for producing certain field crops among different geographical locations and watersheds of the State the regional approach to agricultural planning and development should also be considered as an important measure to maximise the per hectare returns of arable land. In this regard, the State can be divided both vertically and horizontally to identify homogeneous growth zones for the production of suitable food and non-food crops on sustainable basis. In other words, based on prevailing variations in soil characteristics, topography, altitude, rainfall, water availability, climate and suitability of land for producing homogeneous food and non-food crops the Uttaranchal State can be divided into following three broad categories (Shah, 1996, Mehta, 1996).

- (i) **The High Hills:** The altitude ranges above 1500 masl. The climate in concerned zone is sub-tropical to temperate. As a result, the zone have the advantage of successfully growing of off-season vegetables, especially peas and potato and fruits such as apple,

pears, plum, apricot, cherries, banana and walnuts. In addition, food crops like bajra, mandua, zungara, soyabean and traditional pulses can also be grown in this zone.

- (ii) **The Middle Hills:** These ranges from 1000 to 1500 masl. The climate in this zone is tropical to temperate which provide an advantage for growing various off-season vegetables, sub-tropical fruits like orange, banana, plum, apricot. Most land in the zone is lacking the facility of irrigation. The zone has also been identified suitable for growing wheat and paddy in some of the irrigated areas and crops as mandua, oilseeds, pulses and bajra during rainy season.
- (iii) **The Low Hills:** The low hill areas are confined in the range of below 1000 masl, including Taria and Babar areas of the State. Most agricultural land is possessing the facility of irrigation and is very fertile. They form typical to sub-topical climatic conditions and contain deeper soils. As a result, the zone is agriculturally highly developed and the productivity and yield rates of both food and non-food crops are found significantly much higher in this zone as compared to middle and high hill areas. Besides, the low hill areas are indicated to be potentially viable for growing spices, oilseeds, tropical fruits such as mango, leetchi, guava and pappaya and different vegetable crops.

In this sense, the available typical climatic and varied soil conditions and topographic features in different geographical locations of the State are naturally providing an advantage to the farmers to use their available small size of land for growing different high value crops which cannot be grown successfully in other parts of the country. In fact the land available in hilly areas of the State has been recognized economically more suitable for growing horticultural plants and vegetables as compared to field crops. In addition, using available land under the cultivation of fruit crops and vegetable has special important consideration since it provides significantly much higher number of mandays employment than the agricultural crops beginning from the stages of production to its harvesting and marketing (Mehta, 1988). Thus, the replacement of the traditional crops cultivated by others, which are more suited to the local topographic, soil and climatic conditions and are more remunerative and employment oriented could prove among the most viable and important options for achieving the basic objective of generating additional income so as to sustain the livelihood of farming households, especially for marginal farmers in land scarce region such as Uttaranchal.

In fact, growing different varieties of fruits and vegetables, even on small holdings, has gained importance in the State over the years. Both area and production of different vegetables and fruits have been reported consistently increasing in different districts of the State. A shift of 1.5 per cent land as recorded during last decade from the production of tradition crops to the fruits has resulted 18.39 per cent of additional fruits during the corresponding period. The area

under vegetables almost doubled and the production went up one and a half time during the same period. These facts highlight the real situation that the farmers are well aware about the use of their limited land resources among different options, specifically practicing a shift of land from the production of low to relatively high value commercial crops.

OBJECTIVES OF THE PRESENT STUDY

Considering into account the facts stated above the study has attempted to analyze the factors which have been motivating to marginal farmers towards making shift in cropping pattern and to investigate the possibility of strengthening additional diversification and commercialisation of farming system in different geographical locations of the State. Broadly the focus of present study has been centered around to examine the following issues as its basic objectives.

- (i) The existing land use pattern, distribution of land among different social groups of rural households, changing structure of land use and cropping pattern and the possibility of bringing additional land into cultivation under different options.
- (ii) Socio-economic characteristics, pattern of saving and investment, indebtedness, consumption pattern and family living standard, housing and sources of income of marginal farmers across different geographical locations.
- (iii) Structure of production, productivity and marketing of different food crops, fruits, vegetables and other non-food crops assessment related to the extent of differences prevailing in per unit cost of production, returns and absorption of labourforce in using available land under different options, i.e. the production of traditional and non-traditional food crops, fruits and vegetables.
- (iv) Emerging composition and structure of animal husbandry, pattern of animal produce, cost of production, productivity and profitability of rearing different animals.
- (v) Existing changes and shifts in cropping pattern, accessibility situations to different agricultural inputs, problems existing in bringing about the shift of land under different options, and obtaining the agricultural inputs. Assessment on factor motivating and problems enabling to farmers for changing cropping pattern has also been specifically assessed.
- (vi) The views of marginal farmers on their planning and perceptions regarding the possibilities for bringing changes in cropping and land use pattern through introducing the cultivation of high value crops in farming system, adoption of modern techniques of production, kinds of external assistance to be required for initiating diversification in farming system and in adopting alternative modes of agricultural technologies.

- (vii) Finally the study proposed to recommend about the kinds of measures to be initiated for maximising the productivity and returns of marginal farms and the approaches to be adopted for motivating marginal farmers for opting changes in the presently existing cropping pattern.

RESEARCH QUESTIONS AND THE HYPOTHESIS

In addition to above listed objectives, the study has also attempted to examine following research questions and hypothesis in order to clearly understand the situation emerging in changing cropping and land use pattern in different geographical locations and to suggest in details about the kinds of approaches to be initiated for land based development planning in the State.

- (i) The changing nature of cropping pattern as we move up along the farm size continuum across the low, middle and high land areas.
- (ii) Nature of linkages to be established among different geographical areas in terms of technology, methodology, farmer's innovations, which helped in promoting changing cropping system.
- (iii) Extent of linkages emerging between the changing cropping pattern with poverty, unemployment and the pattern of income distribution among different land size groups of farming households.
- (iv) Elements motivating and restricting for diversification of agriculture in terms of opting for using available land for high value crops; and,
- (v) The constraints those marginal farmers may face in terms of food insecurity if they are likely to opt for growing non-food high value crops.

METHODOLOGY AND THE SAMPLE

As the consequences of significantly a larger differences are prevailing in the soil characteristics, irrigation facility, topography, land use pattern, adoption and availability pattern of different agricultural technologies, overall farming system among different regions of the State, even within a region at different geographical locations, we firstly decided to examine the above objectives and hypothesis of the study in both Garhwal and Kumaun regions of the State. Thereafter it was decided to identify one district from each region which have been dominating in terms of production of high value crops, such as oilseeds, fruits, vegetables and other non-traditional crops on one hand and showing highest level of changes in shifting land areas from the production of traditional to non-traditional agricultural crops among the districts of respective

region. In this manner, we selected district Nainital from Kumaun region and district Tehri Garhwal from Garhwal region.

Thereafter, following the similar criteria as undertaken for the identification of sample districts the selection of three development blocks, from each of the district, representing three different geographical locations, i.e. high hills, middle hills and low hills was carried out for a detailed study. Keeping into consideration that the access to the facility of road transport and markets play a crucial role in promoting diversification of economic system, especially agricultural sector, it was proposed to draw the sample of villages for the study from all the three separate locations keeping in mind their access to these facilities. Thus, the first catchment of villages was selected from the area, which had a properly developed road network as well as easy access to market. Such area is represented by low hill areas. A second group of sample villages was identified from middle hill areas, which had developed road network, the marketing facility was almost lacking. The third group of villages had neither the proper facility of market nor was linked by roads. Such area is represented by high hills and in altitudes ranging above 1500 masl. All the three groups of villages were identically selected from two different watershed representing Garhwal and Kumaun regions of Uttaranchal.

The present study is based on both primary as well as secondary data. The secondary data related to land use pattern, structure and size distribution of land holdings, area under different crops production and productivity structure of food grains, fruits, vegetables and other non-food crops, cropping pattern and animal husbandry for each district on time series basis from 1986-87 to 1999-2000 was obtained from the published documents of different State Government Departments. Some of the general information was additionally collected through personal discussions held with the officials of State Government, development agencies and the heads of sample Block Panchayats, Village Panchayats and sample households.

The collection of primary data was undertaken with the help of structured interview schedules. In all we covered 974 households, comprising 518 households from district Nainital and remaining 456 households from district Tehri Garhwal on census basis. Similarly, the households covered from high hill area constituted 333 and remaining 314 and 327 households were covered from middle and low hill areas respectively. Keeping into consideration the recognized facts as stated earlier regarding that all farmers in hilly and mountain areas of Uttaranchal should be considered as marginal farmers. We covered all the farm households existed in sample of villages as identified for the purpose of a detailed study. Thus, in the total size of sample households fairly a high proportion of farm households of 90.65 per cent are found confined in the size group of below 1.0 hectare and remaining 8 per cent and 1.33 per cent households are owing the land size of 1 to 2 hectares and above 2 hectares respectively (Table I.1).

Table I.1: **Details of Sample Households**

(Holding Groups in Hect.)

Area/Districts	Total Villages	Total Households by Size of Land Holdings			
		Below 1.00	1.00 – 2.00	2.00+	Total
A. Nainital	9	457	48	13	518
1. High Hills	3	154	27	2	183
2. Middle Hills	3	153	10	1	164
3. Low Hills	3	150	11	10	171
B. Tehri Garhwal	9	426	30		456
1. High Hills	3	140	10	--	150
2. Middle Hills	3	138	12	--	150
3. Low Hills	3	148	8	--	156
TOTAL	18	883	78	13	974
1. High Hills	6	294 (88.29)	37 (11.11)	2 (0.60)	333 (100.00)
2. Middle Hills	6	291 (92.68)	22 (7.09)	1 (0.32)	314 (100.00)
3. Low Hills	6	298 (91.13)	19 (5.81)	10 (3.06)	327 (100.00)

EMERGING LAND USE PATTERN

In the State, a major part of around 63 per cent area is covered by the forests, though it is relatively less as per the norms laid down under the forest policy as laid down by the Government of India in 1988, which recommended that at least 66.7 per cent area in hilly areas should be under the forest cover. Utilisation of land area for agricultural purposes is very low at 14.02 per cent which in fact has been declining considerably at the rate of 0.7 per cent annually due to increasing land degradation, un-willingness of farming communities to remain engaged in low economic return based agricultural occupations, shifting occupational structure of employment and increasing out-migration of male labourforce outside State. What is more striking feature emerging over the years is the increasing tendency of farmers to leave a sizeable proportion of cultivated land area as fallow regularly for every year in each crop season on rotation basis for the purpose of regaining its fertility. Such tendency of leaving land uncultivated as fallow is seen highly developing among the farmers in purely hilly areas. Increasing pace of urbanisation and construction activities has also accumulated the scarcity of land to be used for agricultural purposes during the recent past. At the same time it may also be postulated the fact that to a large extent, the land which was not used for crop production has been mainly being diverted towards the above twin purposes while the decreasing trends in cultivated land area could be the result of consistently increasing trend revealed in the land area being put as fallow during the recent past. In all, the land put to non-agricultural purposes has increased around 20 per cent during the period of last thirteen years. Similarly, the wasteland and land under miscellaneous trees, herbs and orchards has shown at least some degree of increasing trends while the barren, uncultivable, pasture and grazing land has been considerably declining largely due to its increasing use for non-agricultural purposes over the years.

The most unpleasant feature that is emerging from the above analysis is that the cultivated land area has been consistently narrowing down. Despite the fact that the limited availability of land with the farming communities has been viewed as the basic emerging problem for planning development of farming sector in the State. Conceptually the land area under cultivation may be increased to a certain extent through initiating the development of pasture, cultivable and permanent fallow land which accounts 16.35 per cent of the total reported land area. In fact, the land put under the category of wasteland and other fallow land which together constitutes for 12 per cent of the reported area had been earlier used for agricultural purposes. By definition, this land is mainly under the private ownership and under the present set of regulation the respective land can be brought out under the cultivation.

Table I.2: Land Use Pattern

Land Use	1989-90	1993	1999	(Area in Hectares)		
				Percentage Change		
				1989-90 to 1993	1993 to 1999	1987 to 1999
1. Reported Area	5556737 (100.00)	5559641 (100.00)	5592361 (100.00)	0.05	0.59	0.64
2. Forest Area	3458577 (62.24)	3472702 (62.46)	3498447 (62.56)	0.41	0.74	1.15
3. Barren and Unculturable Land	300930 (5.42)	298764 (5.38)	294756 (5.27)	-0.72	-1.34	-2.05
4. Land put to non-agricultural uses	138907 (2.50)	156502 (2.82)	166324 (2.98)	12.67	6.28	19.74
5. Culturable wasteland	321997 (5.79)	318179 (5.72)	324413 (5.80)	-1.19	1.96	0.75
6. Permanent Pasture and grazing land	272367 (4.90)	227882 (4.10)	228940 (4.09)	-16.33	0.46	-15.94
7. Miscellaneous Trees, Herbs Orchards, etc. not included in Net Area Sown	209347 (3.77)	218882 (3.94)	217033 (3.88)	4.56	-0.84	3.67
8. Current Fallow	14167 (0.26)	11834 (0.21)	11257 (0.20)	-16.47	-4.88	-20.54
9. Other Fallow	48399 (0.87)	67535 (1.21)	67044 (1.19)	39.54	-0.73	38.52
10. Net Area Sown	792046 (14.25)	787361 (14.16)	784117 (14.02)	-0.59	-0.41	-1.00

Source: Agricultural Census, Board of Revenue, Lucknow, Uttar Pradesh.

STRUCTURE OF LAND DISTRIBUTION

Presently the land under cultivation is accounted for only 7.84 lakh hectares. This small land, in which major part is lacking the facility of irrigation and is very low productive, is distributed among 15.59 lakh cultivators, representing about 750 thousand farming households. The farmers are owing very small parcel of land for cultivation. Even a sizeable part of this land is not being utilised for either kharif or rabi crops, and have to kept uncultivated because most land has been degraded and has lost its productive capacity to a larger extent. Therefore, the farmers are making the practice of keeping this land (64 thousand hectares) as fallow in

alternate years to regain its fertility. In the total cultivated land area, over 64 per cent (90 per cent in hill areas and 24 per cent in plain areas) does not have irrigation facilities.

According to agricultural census, the total numbers of operational holdings in the state accounted for 926 thousands, of which around 89 per cent are in the size group of below 2 hectares and the holding size of above 4 hectares are constituting only 3 per cent and remaining 8 per cent are in the group of 2 to 4 hectares. Average size of holdings is accounted for 0.92 hectares, comprising 0.79 hectare in hill areas and 1.40 hectares in plain areas. Per cultivator average size of land area is only 0.55 hectare and it is again relatively at lower level in hill areas as compared to plain areas of the State.

Over the years, fragmentation of land holdings has been highly visualized due to unprecedently increasing volume of rural population and the number of farming households. The analysis presented in Table I.3 reveals that there has been a trend towards marginal farms and its number increased from 598 thousands in 1990-91 to 664 thousands in 1995-96. The proportions of holdings falling in the size class of below 2 hectares have shown a significant increasing trend while those with above 2 hectares have been subsequently declining over the years. Consequently, the area under the marginal farms of below 1 hectare increased from 224 thousand hectares to 233 thousand hectares. In fact the area under the holding size of 1 to 2 hectares has also substantially increased from 203 thousand hectares to 214 thousand hectares but it declined significantly for relatively larger farm size groups. This clearly indicates the fact that the medium and large size of holdings is being fragmented largely and it resulting the increasing rate of marginal farms. The annual growth rate of below 1 hectare of farms has been estimated as higher at 2.19 per cent followed by 0.97 per cent for next higher size class of holding (1 to 2 hectares), 0.03 per cent for 2 to 4 hectares taken together. While the highest size class of holdings of above 10 hectares have been declining at the rate of 2.44 per cent annually.

Table I.3: Structure of Land Holdings

Size Class of Holdings (in hect.)	1990-91			1995-96		
	Number of Holdings	Area	Average Size of Holdings	Number of Holdings	Area	Average Size of Holdings
Upto 1.00	598143 (61.87)	224031 (26.90)	0.37	663724 (71.63)	233268 (27.15)	0.35
1.00 – 2.00	145646 (18.88)	203160 (24.39)	1.39	152694 (16.47)	213899 (24.89)	1.40
2.00 – 4.00	81269 (13.39)	221190 (26.56)	2.72	81402 (8.79)	219982 (25.60)	2.70
4.00 – 10.00	25978 (5.53)	144516 (17.35)	5.56	26920 (2.91)	148321 (17.26)	5.51
10.00 and Above	2096 (0.33)	39989 (4.80)	19.08	1840 (0.20)	43850 (5.10)	23.83
All Categories	853132 (100.00)	832886 (100.00)	0.98	926580 (100.00)	859320 (100.00)	0.92

Source: Agricultural Census, Board of Revenue, Lucknow, Uttar Pradesh.

In all the average size of land per holding declined from 0.98 hectares in 1990-91 to 0.92 hectares in 1995-96, which is mainly a direct reflection of the division of land holdings. Interestingly, it has also been pointed out that the average size of holdings are narrowing down in almost the size classes, excepting in the size class of 1 to 2 hectares it has marginally increased from 1.39 hectares to 1.40 hectares between 1990-91 to 1995-96.

Moreover, a significant level of inequalities has been recognized in the pattern of land distribution among different size classes of holding on one hand and changing structure of land size of the different groups of holdings on the other. This has been indicated by the fact that in the total numbers of holdings the phase of largest size class of holdings accounted for only 0.20 per cent but they have been covering the land area of above 5 per cent and the average size of these holdings consisted size of 23.83 hectare. On the other, the proportion of marginal farms accounted at higher at 72 per cent but they are covering only 27 per cent of land area and the average size of holdings comprises of 0.35 hectare of land. It has also to be noted that despite the consistent declining trend revealed in the net cultivated land area in the State over the years the operational land area has been increasing at the rate of 0.53 per cent annually. The declining trend in cultivated land area could be largely due to increasing tendency of farmers to leave a sizeable portion of their land as fallow every alternative year while the pattern in increasing operational land area is the result of increasing encroachments over the common lands and deforested land coupled with the initiatives undertaken for development of pasture, grazing and unculturable land for bringing this category of land under the cultivation from the part of individual farmers during the recent past.

CHAPTER II

MARGINALITY OF FARMS AND THE MARGINAL FARMERS

MARGINALITY OF FARMS

The quantum of land and its quality are the two dimensions to be used for defining the marginality of farmers. However, in defining marginal farms the quality of land has generally been ignored while the farm size below one hectare have been put under the category of marginal farms and the farming on possessing less than one hectare of land are considered as the marginal farmers. Broadly, the marginal farms should be defined in various ways and different terms like the marginal, low potential and resource poor, fragile, vulnerable or degraded farms (Pratap, 1988, CGIR, 1999). The classification of farms into different categories also depends upon a number of other factors such as nature of soil, cropping pattern adopted, proportion of land of different size classes of farms under the facility of irrigation, productivity and so on. For example, a size of land holding which is considered marginal for crop production might be good enough for growing fodder or fruit cultivation or for certain high value cash crops. Thus, a marginality is a context specific phenomenon not only in terms of lowest position of marginal entity vis-à-vis the mainstream situation as has been officially adopted for defining marginal farms, but also in terms the context or indicators (e.g., endowments or income stream, etc.) with reference to which marginal status of a group etc. to be assessed (Jodha, 1999).

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Moreover, in the context of Uttaranchal the marginal farms should be defined keeping into consideration the quality of land. In fact the average size of holdings constituted to 0.92 hectare, of which a larger part is lacking the facility of irrigation. Even a fairly larger proportion of over 96 per cent of holdings are confined in the category of below 2.00 hectares while the per farmer cultivated land areas is only 0.60 hectare. In addition, increasing degradation of arable land due to depletion of various natural resources supporting to the sustainability of agriculture has consequently resulted a considerable declining trends in net cultivated land area, quality of land, the contribution of income originated from farm sector in the total income of farming households and State's net domestic products and per capita income.

As already indicated that as per the secondary data obtained from the documents of Agriculture Department the average size of holdings in the State accounted for 0.92 hectares while according to our sample data the corresponding figure is estimated to be 0.48 hectare. The concerned difference in average farm has been revealed largely due to the fact that the villages covered in our study belonged only to hilly areas of the State and per household size of land area in hill areas is average at much below the level of plain areas of the State.

Based on primary data obtained from the sample villages, it revealed that fairly overwhelming majority of around 91 per cent of farming households, owned less than one hectare land while only little over of one per cent households owned above two hectare of land. The average size of holdings in middle hills are noted relatively smaller as compared in high and low hill areas. Its largely due to the fact that the proportion of households confined in lowest size group of holdings in middle hill areas are relatively higher (93 per cent) as compared to low (91 per cent) and high hill (88 per cent) areas. In all the marginality of land in hill areas of the State has been well reflected in terms of the size of land available with the farming households for cultivation. On an average, the farmers are noted leaving 4.35 per cent of their available size of land as fallow during every alternate crop seasons because of regaining its fertility. Hence, the per farmer actual cultivated land area comes around 0.46 hectare comprising relatively larger in low hill areas (0.52 hectares) followed by 0.47 hectares in high hills and 0.38 hectares in middle hills. However, over the years, no major changes in the per household availability of land areas have been occurred in most of the geographical locations. Exception is the case in high hill areas where the average land area in the land size groups of farmers of below 1 hectare has declined marginally from 0.41 hectare to 0.40 hectare as against the increase of 6 per cent and 3.38 per cent area in the group of above 2 hectares respectively during 1997 and 2002. Again, tendency of leaving available arable land as fallow among the farmers in different areas, except in high hill areas seems to be narrowing down significantly or has been washing away over the years. Only in high hill areas, the proportion

Table 2.1: Distribution of Land among the Households in Different Geographical Locations

Size of Holdings (Ha.)	(Number of Households)				Average Size of Holdings
	High Hills	Middle Hills	Low Hills	All Areas	
Below 1.0	294 (88.28)	291 (92.67)	298 (91.13)	883 (90.66)	0.36
1.0 — 2.0	37 (11.12)	22 (7.00)	19 (5.81)	78 (8.01)	1.30
2.0 and above	2 (0.60)	1 (0.33)	10 (3.06)	13 (1.33)	3.80
Total	333 (100.00)	314 (100.00)	327 (100.00)	974 (100.00)	0.48
Average size of holdings	0.52	0.40	0.53	0.48	

of land areas used for cultivation has declined from 94.23 per cent in 1997 to 90.38 per cent during 2002. Increasingly lacking irrigation facilities in high hill areas could be the only explanatory factor which is forcing the farmers to leave a sizeable part of their arable un-irrigated land area to un-cultivated. Since, the per household irrigated land area in high hill areas has been recorded only 8.51 per cent as against 23.68 per cent in middle hill areas and 82.69 per cent in low hill areas.

Table 2.2: **Average Size of Holdings and Per Household Cultivated Land**

Location/ Year		(Holdings in hectares)							
		Average Size of Holdings				Per Household Cultivated Land			
		Below 1.0	1.0-2.0	2.0 and Above	All	Below 1.0	1.0-2.0	2.0 and Above	All
High Hills	1997	0.41	1.28	2.07	0.52	0.38	1.26	1.77	0.49
	2002	0.40	1.32	2.17	0.52	0.37	1.15	1.91	0.47
Middle Hills	1997	0.34	1.12	2.40	0.40	0.32	1.06	1.80	0.38
	2002	0.34	1.12	2.40	0.40	0.32	1.07	1.80	0.38
Low Hills	1997	0.34	1.48	4.26	0.52	0.33	1.46	4.09	0.51
	2002	0.34	1.48	4.26	0.52	0.34	1.46	4.09	0.51
All Areas	1997	0.36	1.29	3.78	0.48	0.35	1.25	3.56	0.46
	2002	0.36	1.30	3.80	0.48	0.34	1.20	4.35	0.46

Moreover, inadequately available irrigation facilities seems to be reducing the actual cultivated land areas to a larger extent and making the lands more marginal, especially in high hill areas. The actual irrigated land in sample areas constituted around 40 per cent though it reported fairly larger in low hill areas (82.69 per cent) as compared to middle (22.50 per cent) and high (7.69 per cent) hill areas. It has further pointed out that the farmers are mainly keeping the un-irrigated land as fallow because it contains low fertility and requires to keep uncultivated for at least one crop season to regain its fertility. On an average the farmers are keeping 5.50 per cent of the land area as uncultivated during every alternative year, mainly during the in rabi crop season. However, the corresponding figure has been estimated to be highest at 9.29 per cent in high hill areas followed by 6.95 per cent in middle hill areas and lowest at around one per cent in low hill areas. Thus, it seems that lacking irrigation facility is largely promoting to the marginal status of lands in the State. As the farmers have been mainly using the irrigated land area regularly for growing crops in each of the cropping land area regularly for growing crops in each of the cropping season while they do not possess any option to use their un-irrigated land except to leave it uncultivated. Such farming practices have been largely reducing the actual land area as brought out under cultivation during a year span. Scarcity in the availability of arable land among the farmers in different geographical locations is also generally met out by them through making illegal

encroachments in common lands, and forest lands. However, such category of land does not have the irrigation facility and its share in total reported area is registered only less than one per cent.

Table 2.3: **Characteristics of Land in Different Locations**

Characteristics of Land	(Area in Hectares)							
	High Hills		Middle Hills		Low Hills		All Areas	
	Irrigated	Total	Irrigated	Total	Irrigated	Total	Irrigated	Total
Total Land Area	14.50	172.88	33.04	127.06	140.72	172.04	188.26	471.98
Net Cultivated Land	14.30	157.60	33.04	118.58	140.72	170.24	188.06	446.42
Encroached Land	--	1.56	--	0.32	--	0.22	--	2.40
Fallow and other uncultivated land	0.20	15.28	--	8.48	--	1.80	0.20	25.56
Per Household Total Land	0.04	0.52	0.11	0.40	0.43	0.53	0.19	0.48
Per Household Cultivated Land	0.04	0.47	0.09	0.38	0.43	0.52	0.18	0.45

Further, the analysis on land characteristics related to different size groups of farms presented in Table 2.14 depicts that the intensity of utilizing available land through bringing it under cultivation has been directly influenced by the proportion of land area of different land groups of farmers is acquiring the facility of irrigation rather than the quantum of land available with the farming households. Since the irrigated land is reported significantly at highest proportion at 89.20 per cent for favour of larger farm groups of above 2.0 hectares followed by 38.16 per cent for lowest farm group and 30.76 per cent for middle farm groups. Similarly the proportion of cultivated land area to total reported land has also been invariably noticed at the similar order for different farm groups. However, hardly any relationship is persisting between the pattern of leaving land as fallow and the average size of land owned by the farmers. In stead, the unirrigated land is generally being left as fallow by every land size groups of farmers. To a certain extent the availability of irrigated land among the different land size farmers is seen directly negatively influencing the pattern of leaving land as fallow. Further, the analysis reveals that the farming households which are in possession of relatively smaller size of land holdings of below 2 hectares are only opting to meet their additional requirement of land through making illegal encroachments of common and forest lands.

Table 2.4: **Characteristics of Land by Size of Holdings**

(Area in Hectares)

Characteristics of Land	Size of Holdings							
	Below 1.0		1.0—2.0		2.0 and Above		All Classes	
	Irrigated	Total	Irrigated	Total	Irrigated	Total	Irrigated	Total
Total Land Area	116.26	321.08 (100.00)	28.90	101.56 (100.00)	43.10	49.34 (100.0)	188.26	471.98 (100.0)
Net Cultivated Land	116.26 (38.16)	304.16 (94.73)	28.90 (30.76)	93.94 (92.50)	43.10 (89.20)	48.32 (97.93)	188.06 (42.13)	446.42 (94.78)
Encroached Land	--	2.12	--	0.28	--	--	--	2.40
Fallow and other uncultivated land	0.20	16.92 (5.27)	--	7.62 (7.50)	--	1.02 (2.06)	0.20	25.56 (5.42)
Per Household Total Land	0.13	0.36	0.37	1.30	3.31	3.80	0.19	0.48
Per Household Cultivated Land	0.13	0.34	0.37	0.83	3.31	3.71	0.18	0.45

Note: Figures in brackets represent the percentages to respective totals.

Attempt has been made in Table 2.5 to examine the pattern of distribution of land among different communities' households in the State. Average size of land holdings varied lowest from 0.36 hectares for Scheduled Castes/Tribes to highest at 0.67 hectares for other castes as Sikhs and Backward Castes of households. However, the proportions of households owned below one hectares of lands are fairly highest among Scheduled Castes (96 per cent) closely followed by Brahmins (95 per cent) and Kshetriya (89 per cent) while none of the Brahmin households as against 7 per cent Kshetriya, 4 per cent other castes much as Sikh and Backward followed by 8 per cent each Muslims and SC/ST are possessing above 2 hectares of land area. It may be mentioned that every household in rural areas of the State possesses at least some parcel of land for cultivation. In fact, there has been a very high degree of relationship between the farmer's economic and social status and the land area he possesses for last several generations. Till now the land remains one of the most important factors for determining the class status of a household.

Table 2.5: **Distribution of Different Castes of Households by Size of Land Holdings**

(Area in Hectares)

Caste of Household	Size of Land Holdings				Average Size of Holdings
	Below 1.0	1.0—2.0	2.0 and Above	Total Households	
Brahmins	136 (95.10)	7 (4.90)	00	143 (100.00)	0.44
Kshetriya	522 (89.08)	57 (9.73)	7 (1.19)	586 (100.00)	0.53
Scheduled Castes/ Tribes	192 (96.00)	7 (3.50)	1 (0.50)	200 (100.00)	0.36
Muslims	9 (69.23)	3 (23.07)	1 (7.70)	13 (100.00)	0.54
Others	24 (75.00)	4 (12.50)	4 (12.50)	32 (100.00)	0.67
All Castes	883 (90.65)	78 (8.00)	13 (1.35)	974 (100.00)	0.48

Note: Figures in brackets represent the percentages to respective totals.

SOCIO-ECONOMIC CHARACTERISTICS

In poor agrarian economies of the State, particularly in its hill and mountain areas where all size class of holdings are almost marginal, land continues to be one of the prime sources of livelihood and employment. There seems to be a close relationship between the size of family and the size of holdings which the farming households are owned. The average size of family of households those possessing less than one hectares of land is consisted of 5.59 members and it further increases to 6.56 members for farm holders of 1 to 2 hectare and reached at the range of above 7 members for farm households possessing above 2 hectares of land area while average size of family of all groups of farm households together consisted of 5.69 members (Table 2.6). In fact, over one half of the farm households reported to have more than six members in their family and the family size of a lowest proportion of households accounted for less than three members. However, across the different geographical locations the average size of family has been marginally varying from highest of 5.97 members in high hill areas to lowest of 5.49 members in low hill areas.

Table 2.6: **Distribution of Households by Size of Family and Holding Sizes**

(Number of Households)

Size of Holdings (Hectares)	Size of Family				
	Below 3.0	4.0 – 5.0	6.0 and Above	Total Households	Average Size of Households
Below 1.0	95 (10.76)	344 (38.96)	444 (50.28)	883 (100.00)	5.59
1.0 to 2.0	3 (3.85)	20 (25.65)	55 (70.52)	78 (100.00)	6.56
2.0 and Above	--	5 (38.46)	8 (61.54)	13 (100.00)	7.08
All Households	98 (10.06)	369 (37.89)	507 (52.05)	974 (100.00)	5.69

Note: Figures in brackets represent the percentages to respective totals.

The size of population of all farm households together comes to around 5.5 thousand, comprising around 3 thousand for men and remaining 2.57 thousand for women. The sex ratio in these household stand to 863 women per 1000 men population and the corresponding figure for low hills is revealed relatively higher at 876 women as against 870 women in middle hills and 846 women in high hills. Further we find a negative relationship is persisting between the size of holdings of farm households and the prevailing sex ration in their households. As the population of women per 1000 men population has been found highest at 867 in bottom size of households followed by 848 in medium and lowest at 735 in upper size of farm households.

Table 2.7: **Demographic Structure in Different Geographical Locations**

Demographic Indicators	High Hills	Middle Hills	Low Hills	All Areas
A. Total Population	1989	1756	1794	5539
1. Men	1077	939	956	2972
2. Women	912	817	838	2567
B. Working Status				
1. Employed	959	861	873	2693
(a) Men	509	465	455	1429
(b) Women	450	396	418	1264
2. Unemployed	12	12	19	43
(a) Men	11	12	19	42
(b) Women	1	--	--	1
3. Students	650	585	613	1848
(a) Boys	383	350	359	1092
(b) Girls	267	235	254	756
4. Housewives	61	87	75	223
5. Children	278	177	183	638
6. Others	29	34	31	94
C. Sex Ratio	846	870	876	863
D. Dependency Ratio	2.07	2.03	2.05	2.06
1. Men	2.11	2.02	2.10	2.08
2. Women	1.79	2.06	2.00	2.03
E. Literacy	78.48	75.40	71.29	74.92
1. Men	79.48	84.67	84.83	82.84
2. Women	61.62	64.75	74.79	65.76
F. Work Participation Rate	48.22	49.03	48.82	48.62
1. Men	47.26	49.52	47.59	48.08
2. Women	49.34	48.47	49.88	49.24

Similarly, the working age group of population in marginal farm households is seen hardly remaining under the situation of unemployment due to economic compulsions of their poor households. Poor economic conditions of their households compel them to accept even every low paid employment. It is, therefore, we find that the rate of unemployment among this vulnerable group stands only less than one per cent points, varying highest at 1.06 per cent in low hills to 0.60 per cent in high hills and 0.68 per cent in middle hills. In all the rate of un-employment has been reported fairly to a larger level at 5.44 per cent for relatively larger farm groups of households as against only 0.75 per cent for bottom farm households. Even the dependency rate of non-working population over their working population is estimated to be on 2.06 per cent and it is almost at similar level among the households located in different geographical locations, but it has been noticed relatively higher for households with larger farms. On the other hand the women population is seen largely confined in different occupations of employment as compared to men population particularly in middle hills and those belonging to bottom two groups of farm households. This pattern has directly reflected a low rate of dependency among women as compared to men. Even the women are seen hardly remain under the situation of unemployment.

Rather they are forced to engage in the farms of their households or to engage on certain wage paid employment so as to contribute income for their poor households.

Table 2.8: **Demographic Structure According to Size of Holdings**

Demographic Indicators	Size of Land Holdings			
	Below 1.0	1.0 – 2.0	2.0 & Above	All Categories
C. Total Population	4935	512	92	5539
1. Men	2642	277	53	2972
2. Women	2293	235	39	2567
D. Working Status				
1. Employed	2383	269	41	2693
(a) Men	1255	145	29	1429
(b) Women	1128	124	12	1264
2. Unemployed	37	1	5	43
(a) Men	36	1	5	42
(b) Women	1	--	--	1
3. Students	1664	156	28	1848
(a) Boys	975	101	16	1092
(b) Girls	689	55	12	756
4. Housewives	188	22	13	223
5. Children	579	55	4	638
6. Others	84	9	1	94
C. Sex Ratio	867	848	735	863
D. Dependency Ratio	2.05	1.90	2.24	2.06
1. Men	2.11	1.91	1.83	2.08
2. Women	2.03	1.89	3.25	2.03
E. Literacy	74.51	77.15	84.78	74.92
1. Men	82.14	87.37	94.34	82.84
2. Women	65.72	65.11	71.80	65.76
F. Work Participation Rate	48.29	52.54	44.57	48.62
1. Men	47.50	52.35	54.72	48.08
2. Women	49.19	52.76	30.77	49.24

In spite of being very vulnerable category in terms of economic considerations of the marginal-farming households the population of these households seems to be very reluctant in availing different educational facilities. Since the literacy proportion among the family members of these households is estimated to be as higher at 75 per cent and it reaches to an extent of 78.48 per cent in high hills to 75.40 per cent in middle hills and 71.29 per cent in low hills. However, the proportions of literate women are far behind to their men counterpart in all the geographical locations and the concerned differences are significantly higher in middle hills followed by low hill at lowest level in high hills. It has further been noted that the literacy rates of both men and women in different farm groups of households are positively related to their farm size. The combined literacy rate of men and women population for upper farm of households is accounted for nearly 85

per cent and it decreases to 77 per cent medium farm groups and 75 per cent for bottom farm groups (Table 2.8).

Table 2.9: **Educational Characteristics of Family Members Across Different Geographical Locations**

Locations		Illiterate	Literate	Primary	Secondary	Higher	All Categories
High Hills	Men	221 (20.52)	224 (20.80)	441 (40.95)	269 (15.69)	22 (2.04)	1077 (100.00)
	Women	350 (38.38)	221 (24.23)	255 (27.96)	79 (8.66)	7 (0.77)	912 (100.00)
	Total	571 (28.71)	445 (22.37)	696 (34.99)	248 (12.47)	29 (1.46)	1989 (100.00)
Middle Hills	Men	144 (15.34)	198 (21.09)	361 (38.45)	198 (21.09)	38 (4.05)	939 (100.00)
	Women	288 (35.25)	178 (21.79)	274 (33.54)	62 (7.59)	15 (1.84)	817 (100.00)
	Total	432 (24.60)	376 (21.41)	635 (36.16)	260 (14.81)	53 (3.02)	1756 (100.00)
Low Hills	Men	145 (15.17)	155 (16.21)	349 (36.51)	225 (23.54)	82 (8.58)	956 (100.00)
	Women	241 (28.76)	168 (20.85)	271 (32.34)	133 (15.87)	25 (2.98)	838 (100.00)
	Total	386 (21.52)	323 (18.00)	620 (34.56)	358 (19.96)	107 (5.96)	1794 (100.00)
Total	Men	510 (17.16)	577 (19.42)	1151 (38.76)	592 (19.20)	142 (4.78)	2972 (100.00)
	Women	879 (34.24)	567 (22.09)	800 (31.17)	274 (10.69)	47 (1.83)	2567 (100.00)
	Total	1359 (25.08)	1144 (20.65)	1951 (35.22)	866 (15.64)	189 (3.41)	5539 (100.00)

Note: Figures in brackets indicate the percentages to column totals.

Considering into account the educational characteristics of the family members of households it revealed that the proportion of population to have acquired at least some level of education is quite significant in each of the geographical locations. The illiterate population is registered only little over 25 per cent, 28.71 per cent in high hill, 24.60 in middle hills and 21.52 per cent in low hills. And the proportion of illiterate women stand fairly at higher level as compared to men in all locations. On the other hand, the illiteracy situation among the family members of different farm households is seen largely governed by the availability pattern of the size of land with them. As the proportion of illiterate population are seen declining with the every increase of farm size of households. However, an overwhelming majority of population has been indicated to have availed the educational level of below primary standard (55.87 per cent) and the corresponding proportions are, more or less at similar level in different geographical locations. However, a remarkable level of differences are well appearing in the proportion of population who have

attained primary and higher level of education across the different farm size of households. The proportion of below primary educated population revealed at lowest level of around 39 per cent for larger farm households followed by 54 per cent for households possessing 1 to 2 hectares land while the corresponding proportions increased to 60 per cent for bottom farm groups of households. The proportion of population who attained higher level of education is noted merely 3.41 per cent, comprising 4.78 per cent for men and 1.83 per cent for women. Among the population reported to have availed higher education are largely belonged to low hill areas and relatively larger farm groups of households.

Table 2.10: **Educational Characteristics of Family Members BY Size of Holdings**
(Holdings in Hectares)

Size of Holdings/ Sex	Level of Education					
	Illiterate	Literate	Primary	Secondary	Higher	All Categories
Below 1.0	1258 (25.49)	1056 (21.40)	1723 (34.91)	744 (15.08)	154 (3.12)	4935 (100.00)
Men	472 (17.87)	532 (20.14)	1005 (38.04)	517 (19.57)	116 (4.39)	2642 (100.00)
Women	786 (34.28)	524 (22.85)	718 (31.31)	227 (9.90)	38 (1.66)	2293 (100.00)
1.0 – 2.0	117 (22.85)	82 (16.02)	198 (38.67)	92 (17.97)	23 (4.49)	512 (100.00)
Men	35 (12.64)	41 (14.00)	124 (44.77)	61 (20.02)	16 (5.78)	277 (100.00)
Women	82 (34.89)	41 (17.45)	74 (31.49)	31 (13.19)	7 (2.98)	235 (100.00)
2.0 and Above	14 (15.22)	6 (6.52)	30 (32.61)	30 (32.61)	12 (13.04)	92 (100.00)
Men	3 (5.66)	4 (7.55)	22 (41.51)	14 (26.42)	10 (18.87)	52 (100.00)
Women	11 (28.21)	2 (5.13)	8 (20.51)	16 (41.03)	2 (5.13)	39 (100.00)
Total	1389 (25.08)	1144 (20.65)	1951 (35.22)	866 (15.64)	189 (3.41)	5539 (100.00)
Men	510 (17.16)	577 (19.42)	1151 (38.73)	592 (19.20)	142 (4.78)	2972 (100.00)
Women	879 (34.24)	567 (22.09)	800 (31.17)	274 (10.67)	47 (1.83)	2567 (100.00)

Note: Figures in brackets indicate the percentages to column totals.

OCCUPATIONAL STRUCTURE OF EMPLOYMENT

As indicated in the previous chapter that the agricultural activities have been playing a dominant role in providing employment opportunities to a larger proportion of labourforce in the State for past several generations. However, the agriculture sector is neither in a position to engage the entire rural labourforce on regular basis for the whole year nor the income being

originated from the concerned sector is sufficient to sustain the livings of the rural households due to the marginal nature of available land, and the certain factors as highlighted already. Hence, the rural labourforce in different geographical locations is forced to move into a number of occupations available within the rural areas because the amount of income originated through participating in a single occupation becomes quite insignificant to maintain the livelihood of their households. Even any occupation can provide a regular productive employment opportunity in the rural areas of the State, excepting the case of Government sector employment. The analysis presented in Table 2.11 reveals that only a little about one-third of workforce, comprising relatively a larger proportion in low hill areas (39 per cent), followed by 30 per cent in high hills and 28 per cent in middle hills has been noted engaged only a single occupation. Around 35 per cent and 32 per cent rural workforce is seen engaged in two and more than two occupations respectively. In all, the need of workforce to be engaged in above two occupations seems generally higher in high hill areas as compared to remaining locations partly may be the result of the availability of largely low paid occupations and partly being the lower levels of per hectare productivity of land.

Table 2.11: **Occupational Structure of Family Workforce**

Size of Holdings/ Area (Hectares)	Number of Occupations of the Workers			
	One	Two	Two and Above	Total Workers
Below 1.0	740 (31.05)	822 (34.49)	821 (34.45)	2383 (100.00)
High Hills	231 (28.52)	194 (23.95)	385 (47.53)	810 (100.00)
Middle Hills	212 (36.80)	318 (40.20)	261 (33.00)	791 (100.00)
Low Hills	297 (37.98)	310 (39.64)	175 (22.38)	782 (100.00)
1.0 to 2.0	115 (42.75)	110 (40.89)	44 (16.36)	269 (100.00)
High Hills	52 (38.52)	59 (47.70)	24 (17.78)	135 (100.00)
Middle Hills	29 (43.28)	25 (37.31)	13 (19.41)	67 (100.00)
Low Hills	34 (50.75)	26 (38.81)	7 (10.45)	67 (100.00)
2.0 and Above	19 (46.34)	17 (41.46)	5 (12.20)	41 (100.00)
High Hills	9 (64.29)	4 (28.57)	1 (7.14)	14 (100.00)
Middle Hills	1 (33.33)	2 (66.67)	--	3 (100.00)
Low Hills	9 (37.50)	11 (45.83)	4 (16.67)	24 (100.00)
All Groups	874 (32.46)	949 (35.24)	870 (32.30)	2693 (100.00)
High Hills	292 (30.45)	257 (26.80)	410 (42.75)	959 (100.00)
Middle Hills	242 (28.11)	345 (40.07)	274 (31.82)	861 (100.00)
Low Hills	340 (38.95)	347 (39.75)	186 (21.30)	873 (100.00)

Note: Figures in brackets indicate the percentages to column totals.

It has further been noted that the size of land available with the farming households is largely determining the movements of its working workforce into different categories and numbers of occupations. The workforce remaining concentrated to engage in a single occupation accounted at lowest proportion of 31 per cent in case of those belonging to bottom size of farm households and it increased to 42.75 per cent for medium farm households and 46.34 per cent for upper farm households. On the other, an inverse relationship between the proportions of workforce those participating in above two occupations and the size of land available with their households has been well reflecting in Table 2.11. The proportions of workforce engaged in more than two occupations are reflected highest for bottom farm groups of households (34.45 per cent) followed by middle (16.36 per cent) and upper (12.20 per cent) farm households.

Table 2.12: **Employment Structure of Working Family Members in Different Geographical Locations (Principal Occupation)**

Locations		Agriculture and Allied	Business	Household Industry	Services	Construction Labourers	Others	Total
High Hills	Men	325 (63.85)	28 (5.50)	24 (4.72)	56 (11.00)	70 (13.75)	6 (1.18)	509 (100.00)
	Women	445 (98.89)	--	--	3 (0.67)	2 (0.44)	--	450 (100.00)
	Total	770 (80.29)	28 (2.92)	24 (2.50)	59 (6.75)	72 (7.51)	6 (0.63)	959 (100.00)
Middle Hills	Men	232 (49.89)	31 (6.67)	25 (5.38)	93 (20.00)	74 (15.91)	10 (2.15)	465 (100.00)
	Women	389 (98.23)	--	2 (0.51)	5 (1.26)	--	--	396 (100.00)
	Total	621 (72.13)	31 (3.60)	27 (3.14)	98 (11.38)	74 (8.60)	10 (1.16)	861 (100.00)
Low Hills	Men	231 (50.77)	27 (5.93)	16 (3.52)	108 (23.74)	67 (14.73)	6 (1.32)	455 (100.00)
	Women	414 (99.04)	--	--	3 (0.72)	1 (0.24)	--	418 (100.00)
	Total	645 (73.88)	27 (5.93)	16 (1.83)	111 (12.72)	68 (7.79)	6 (0.69)	873 (100.00)
Total	Men	788 (55.14)	86 (6.02)	65 (4.55)	257 (17.99)	211 (14.77)	22 (1.54)	1429 (100.00)
	Women	1248 (98.73)	--	2 (0.16)	11 (0.87)	3 (0.24)	--	1264 (100.00)
	Total	2036 (75.60)	86 (3.19)	67 (2.49)	268 (9.95)	214 (7.95)	22 (0.82)	2693 (100.00)

Note: Figures in brackets indicate the percentages to column totals.

Further the structure of employment and the pattern of concentration of workforce in different economic activities across the various geographical locations have been presented in Table 2.12. The analysis highlights the facts that in spite of the very limited cultivated land available with

the farming households, a overwhelming majority of over three fourths of the workforce comprising 99 per cent women and 55 per cent men workforce has been along engaged in farm sector. The corresponding figure of the concentration of workforce is concerned sector is observed as high as 80.29 per cent in high hills followed by 73.88 per cent in low hills and 72.13 per cent in middle hills.

The services sector is seen as the second most important source of employment after farm sector which is providing employment opportunities to 9.95 per cent of the rural workforce though its contribution has been recognized relatively larger in low hills followed by middle and high hills. In addition to farming and service related activities the construction, business and trading, household manufacturing and professional economic activities are the other main sources of providing employment opportunities which together are absorbing around 16 per cent of labourforce.

Table 2.13: **Employment Structure of Working Family Members by Size of Holdings (Principal Occupation)**

(Holding in Hect.)

Size of Holdings/ Sex	Occupation/Activity						Total
	Agriculture and Allied	Business	Household Industry	Services	Construction Labourers	Others	
Below 1.0	1758 (73.77)	73 (3.06)	64 (2.69)	254 (10.66)	213 (8.94)	21 (0.88)	2383 (100.00)
Men	645 (51.39)	73 (5.82)	62 (4.94)	244 (19.44)	210 (16.73)	21 (1.67)	1255 (100.00)
Women	1113 (98.67)	--	2 (0.18)	10 (0.89)	3 (0.27)	--	1128 (100.00)
1.0 to 2.0	239 (88.85)	11 (4.09)	3 (1.12)	14 (5.20)	1 (0.37)	1 (0.37)	269 (100.00)
Men	116 (80.00)	11 (7.59)	3 (2.07)	13 (8.97)	1 (0.69)	1 (0.69)	145 (100.00)
Women	123 (99.19)	--	--	1 (0.81)	--	--	124 (100.00)
2.0 and Above	39 (95.12)	2 (4.88)	--	--	--	--	41 (100.00)
Men	27 (93.10)	3 (6.90)	--	--	--	--	29 (100.00)
Women	12 (100.00)	--	--	--	--	--	12 (100.00)
Total	2036 (75.60)	86 (3.19)	67 (2.49)	258 (9.95)	214 (7.95)	22 (0.82)	2693 (100.00)
Men	788 (55.14)	86 (6.02)	65 (4.55)	257 (17.99)	211 (14.77)	22 (1.54)	1429 (100.00)
Women	1248 (99.73)	--	2 (0.16)	11 (0.87)	3 (0.24)	--	1264 (100.00)

Note: Figures in brackets indicate the percentages to column totals.

Further the analysis depicts that the concentration pattern of rural workforce in agriculture sector is strongly related with the availability pattern of the size of land with the households. The

proportion of workforce confined in agriculture sector for employment is 73.77 per cent from bottom farm households followed by 88.85 per cent from middle and it reaches fairly much larger at 95.12 per cent from upper farm households. The workforce from bottom and middle farm households has been observed equally participating in occupations confined in business and trading, household manufacturing, construction and services sectors besides in farm sector while the workforce from upper farm groups of households is engaged only in farm and business and trading activities. In addition, a highly remarkable feature that emerging in the differential characteristics related to the concentration pattern of men and women workforce in different economic activities is that the concentration of women in agriculture sector is fairly larger as compared to their men counterpart and no woman is found engaged in business and trading and professional activities from any of the farm size of households.

PATTERN OF INCOME GENERATION

Despite the fact that the farm households are possessing a very small size of marginalised, degraded and very low productive land a majority of them are making a best possible use of their available land through diverting it under the production of various food crops, fruits and vegetable so as to maximise the per hectare incomes. In addition, the rural households are possessing certain advantages to derive income for their families through engaging in numbers of non-farm economic activities both within the rural areas as well as through initiating migration into urban areas.

Table 2.14: **Distribution of Households by Number of Income Generation Sources**

Source of Income Generation	Number of Households			
	High Hills	Middle Hills	Low Hills	All Areas
Agriculture	333 (100.00)	314 (100.00)	327 (100.00)	974 (100.00)
Animal Husbandry	286 (85.89)	264 (84.08)	267 (81.65)	817 (83.88)
Horticulture	244 (73.27)	68 (21.66)	45 (13.76)	357 (36.65)
Vegetables	274 (82.28)	265 (84.40)	205 (62.69)	744 (76.39)
Business/Trade	24 (7.21)	27 (8.60)	28 (8.56)	79 (8.11)
Household Industry	32 (9.61)	33 (10.51)	16 (4.89)	81 (8.32)
Wages and Salary	136 (40.84)	141 (44.90)	153 (46.79)	430 (44.15)
Remittances and Pension	54 (16.22)	64 (20.38)	67 (20.49)	185 (18.99)
Others*	40 (12.01)	90 (28.66)	84 (25.69)	214 (21.97)
All Sources	1423	1539	1192	3881
Number of Households	333 (100.00)	314 (100.00)	327 (100.00)	974 (100.00)
Average Number of Sources	4.27	4.90	3.65	3.99

* Other source of income: Professional, Jajmani and transport activities.

Note: Figures in bracket represent the percentages of total households.

However, the advantages in using available land under different options in terms of growing various food and non-food crops differs to a larger extent among different geographical locations. The concerned hypothesis has been well proved by the fact that the proportion of households deriving income through using their available land under the production high value crops such as fruits and vegetables are appreciably much larger in high hill areas as compared to low hill areas while proportion of households originating income through diverting land under the production of vegetables are relatively higher in middle hills as compared to high and low hills, though each of the farm households are using a part of land under the production of food crops in all geographical locations. On an average each farm household is deriving income from at least more than one sources and per household average sources of income are estimated to be around 4 which are marginally higher in middle hills than in high and low hills. Animal husbandry seems to be a most

Table 2.15: **Distribution of Different Farm Households by Number of Income Generation Sources**

Source of Income Generation	Households by Farm Sizes			
	Below 1.0	1.0 to 2.0	2.0 and Above	All Groups
Agriculture	883 (100.00)	78 (100.00)	13 (100.00)	974 (100.00)
Animal Husbandry	730 (82.67)	74 (94.87)	13 (100.00)	817 (83.88)
Horticulture	311 (35.22)	37 (47.44)	9 (69.23)	357 (36.65)
Vegetables	679 (78.90)	53 (47.95)	12 (92.31)	744 (76.39)
Business/Trade	69 (7.81)	9 (11.54)	1 (7.69)	79 (8.11)
Household Industry	79 (8.94)	2 (2.56)	--	81 (8.32)
Wages and Salary	421 (47.68)	9 (11.54)	--	430 (44.15)
Remittances and Pension	169 (19.14)	16 (20.51)	--	185 (18.99)
Others*	194 (21.97)	17 (21.80)	3 (23.07)	214 (21.97)
All Sources	3535	279	51	3881
Number of Households	883 (100.00)	78 (100.00)	13 (100.00)	3881 (100.00)
Average Number of Sources	4.00	3.58	3.92	3.99

* Other source of income: Professional, Jajmani and transport activities.

Note: Figures in bracket represent the percentages of total households.

Important source of income after agriculture sector for around 84 per cent households and over three-fourths proportion of households are deriving at least some income from growing vegetables. Another important source of income of the households in all geographical locations is the income earned as wages and salaries and pension of retired personnel from the services sector. Around 63 per cent households comprising 67 per cent in low hills, 65 per cent in middle hills and a lowest proportion of 57 per cent in high hills, are observed deriving income from wage paid occupations and as pension. Further it revealed that the proportions of households who have adopted animal husbandry as one of the sources of originating income are invariably positively related to the size of farm available with concerned households. Also the pattern of diverting available land of households in the production of various high value crops especially fruits and vegetables is, by and large, seen determined by the size of land available with the households. The concerned conclusion has been reflected by the fact that the provisions of households reported to have been drawing income from growing of horticultural crops and vegetable are remarkably larger among the upper farm groups of households as compared to bottom farm groups. However, the study did find any household among upper farm groups are originating any income from household manufacturing activities, wage paid occupations and as pension.

Table 2.16: Generation of Income from Different Sources in Different Geographical Locations

Source of Income Generation	(Annual Income in Rs.)			
	High Hills	Middle Hills	Low Hills	All Areas
Agriculture	531695 (5.57)	1028765 (7.58)	2182322 (19.45)	374282 (11.64)
Animal Husbandry	2393700 (25.06)	2020610 (14.89)	2061630 (14.20)	6475940 (17.21)
Horticulture	1222482 (12.80)	59981 (0.44)	288831 (2.00)	1571294 (4.18)
Vegetables	615467 (6.47)	1431952 (10.54)	353212 (2.42)	2400631 (6.38)
Business/Trade	467800 (4.90)	558500 (4.12)	482000 (3.32)	1508300 (4.01)
Household Industry	419690 (4.39)	443000 (3.27)	305500 (2.11)	1168190 (3.10)
Wages and Salary	2720380 (28.48)	5565650 (41.02)	5269100 (36.30)	13555130 (36.02)
Remittances and Pension	926900 (9.70)	2089024 (15.40)	2569100 (17.67)	5580724 (14.83)
Others*	250750 (2.63)	372074 (2.74)	369800 (2.55)	992624 (2.64)
All Sources	9548864 (100.00)	13569556 (100.00)	13881495 (100.00)	36999915 (100.00)
Per Household	28675	43215	42451	37988
Per Capita	4802	7727	7738	6680

* Other source of income: Professional, Jajmani and transport activities.

Note: Figures in brackets indicate the percentages of total household in respective farm size.

Further the marginality situation of farm and farm households in different geographical locations has been well visualized while considering into account the per household income being generated from agriculture sector, its contribution in the total income of farm households on one hand and the overall economic situation of the households as measured in terms of per capita and per household income available from different sources on the other. Although per household income as generated from all sources together is estimated at Rs.37.92 thousand which varied largely from Rs.43.22 thousand in low hills to Rs.28.68 thousand in high hills. And the per capita income is accounted to Rs.6667, comprising Rs.7738 in low hills followed by Rs.7728 in middle hills and Rs.4801 in high hills. However, on an average a farm household is in a position to generate the annual income of Rs.7921 from their available size of farms. The corresponding figure of per household income being generated from farm sector accounted to Rs.8637 in low hill areas, Rs.8028 in middle and Rs.7116 in high hill areas. Also the contribution of farm sector in the total income farm households is estimated to be merely 22.20 per cent, though it stands relatively higher in high hill areas (24.84 per cent) as compared to low (23.87 per cent) and middle (18.56 per cent) hill areas. Income earned through wage paid employment has the largest share of 36 per cent in the total income derived by farm households from different sources. Even, its share is reported to be as larger at over 41 per cent in middle hills followed by 36.30 per cent in low hills and at lowest level of 28.48 per cent in high hills. The share of income being originated from animal husbandry has also been witnessed significantly much higher (17.54 per cent) as compared to income earned from the field crops (10.13 per cent). In fact its share is reported as higher at 25.06 per cent for households in high hills as against 15 per cent each in low and middle hills. The per capita income is accounted to Rs.6667, comprising Rs.7738 in low hills closely followed by Rs.7728 in middle hills and Rs.4801 in high hills. However, on an average a farm household is in a position to generate the annual income of Rs.7921 from their available size of farms. The corresponding figure of per household income belongs generated from farm sector accounted to Rs.8637 in low hill areas, Rs.8028 in middle and Rs.7116 in high hill areas. Also the contribution of farm sector in the total income derived by farm households from different sources is estimated to be merely 22.70 per cent, though it stands relatively higher in high hill areas (24.82 per cent) as compared to low (20.34 per cent) and middle (18.57 per cent) hill areas. Income earned through wage paid employment has the largest share of 37 per cent in the total income derived by farm households from different sources. Even, its share is reported to be as large as over 41 per cent in middle hills followed by 36.30 per cent in low hills and at lowest level of 28.48 per cent in high hills. The share of income being originated from animal husbandry has also been witnessed significantly much higher (17.21 per cent) as compared to income earned through food production and its share is reported as higher at 25.06 per cent for households in high hills.

Table 2.17: Generation of Income from Different Sources Across the Size Categories of Farms

(Income in Rs., Holding in Hectare.)

Source of Income Generation	Size of Holdings (Ha.)		
	Below 1.0	1.0 to 2.0	2.0 and Above
Agriculture	2652733 (8.23)	739143 (19.41)	350906 (36.62)
Animal Husbandry	5477550 (17.00)	742290 (19.49)	256100 (26.73)
Horticulture	1066680 (3.31)	346168 (9.06)	158446 (16.54)
Vegetables	1866518 (5.79)	444429 (11.73)	89684 (9.21)
Business/Trade	1177800 (3.65)	289500 (7.60)	41000 (4.28)
Household Industry	1092990 (3.39)	75200 (1.97)	--
Wages and Salary	12991030 (40.31)	564100 (14.81)	--
Remittances and Pension	5068424 (15.73)	512300 (13.45)	--
Others*	836824 (2.60)	92300 (2.42)	63500 (6.63)
All Sources	32230549 (100.00)	3805430 (100.00)	959636 (100.00)
Per Household	36501	48788	73818
Per Capita	6531	7432	10431

* Other source of income: Professional, Jajmani and transport activities.

Note: Figures in brackets indicate the percentages of total household in respective farm size.

Further, the analyses have well proved the universally recognized fact that the economic condition of a farm household is largely determined by the size land concerned household is possessing. Also, the household possessing larger size of holdings have the greater advantages and wide ranging options than the smaller holders of land in terms to allocate available land under the various options which options can provide maximise per hectare income. Thus, the contribution of income generated from farm sector in the total income of upper farm households is reported to be as higher as 62.37 per cent as against 40.23 per cent for medium size farm households and merely 17.33 per cent for bottom farm households. Similarly, average income of upper farm households comes around Rs.74 thousand as against Rs.49 thousand for middle farm households and Rs.37 thousand for bottom farm households. The bottom groups of farm households are seen largely depending on wage-paid employment available, mainly in construction activities, for maintaining their livelihood while the households confined in upper farms do not any way require to adopt wage paid employment. Rather, the income being originated from farm sector is sufficient to sustain their livelihood and any shortcomings are met through borrowings from their relatives. The animal husbandry has been playing an important role in contributing a sizeable amount of income in each size categories of farm household. The contribution of income generated from animal

husbandry to the total income accounted for 18 per cent to highest at 27 per cent for upper size of farm households (Table 2.17).

PATTERN OF SAVINGS AND INDEBTEDNESS

Despite the fact that the marginal farms in different geographical locations are providing a very low amount of per household income and its contribution in the total income of household accounted only 21 per cent it has been well proved that a significant proportion of farm households (78 per cent) are in a position to make at least some amount of savings from the income they generate from certain other sources, mainly from undertaking non-farm activities. However, there seems to be a significant level of variations in the pattern of per household savings and the proportion of households which are doing the savings from different farm sizes. All the households among those possessing above one hectare land are making at least some amounts of saving after meeting their household expenses. However, the corresponding proportion of households from bottom farm groups stands around 75 per cent. Similarly, average amount of saving per household accounted for Rs.18.6 thousand and the corresponding figures stands lowest at Rs.16.92 thousand for bottom farm groups of households as against Rs.32.90 thousand for middle and Rs.31.8 thousand for upper farm households. In fact, fairly a larger proportion of over 79 per cent households, comprising 82 per cent bottom farm households followed by 64 per cent middle farm households and 50 per cent upper size of farm households are in a position to make the saving of less than Rs.30 thousand during a year. On the other, only 3 per cent households, 3.85 per cent

Table 2.18: **Pattern of Savings of Households by Size of Holdings**

Amount of Saving (in Rs.'000)	(Holding in hectare)			
	Number of Households by Size of Holdings			
	Below 1.0	1.0 to 2.0	2.0 and Above	All Categories
Below 30	541 (81.85)	50 (64.10)	9 (50.00)	600 (79.26)
30 – 50	58 (8.78)	20 (25.64)	4 (22.22)	82 (10.83)
50 – 100	42 (6.34)	5 (6.41)	5 (27.78)	52 (6.87)
100 and Above	18 (2.70)	3 (3.85)	--	21 (2.77)
Total	661 (100.00) (74.86)	78 (100.00)	18 (100.00)	757 (100.00) (77.72)
Sample Households	883 (100.00)	78 (100.00)	18 (100.00)	974 (100.00)
Per Household Savings	16922	32906	31806	18564

among middle and 2.70 per cent among bottom farm groups are undertaking the saving of above Rs.100 thousand. The overall picture which is emerging through considering the contribution of different sources in the total income of different farm households and the situation emerging in the pattern of savings for respective farm groups of households it may be mentioned that the amount of being generated together from animal husbandry and farming activities has been recognized sufficient to sustain the livelihood of upper farm households, especially those are in low hill areas. Even the concerned groups of households are in a better position than the remaining two groups of households to save at least some amounts of money generated from farm and animal husbandry. And the income being originated alone from farming seems to be inadequate to sustain the livelihood of almost the farm groups of households. In fact, the livelihood of medium and bottom farm households can not be sustained unless their participation in non-farm sector has to be maximised. Over and above, it may be noted that amount of savings occurred in cases of bottom and medium farm households may be attributed as the consequences of a sizeable amount of income which the concerned households are deriving through participating in wage-paid employment and other non-farm occupations.

Table 2.19: **Pattern of Indebtedness of Households by Locations**

(In Rs.'000)

Location	Households by Size of Indebtedness								Average Size of Indebtedness
	Below 10	10-20	20-30	30-50	50 and Above	Total Households			
						Indebted	Non-Indebted	Total	
High Hills	43 (12.91)	18 (5.41)	6 (1.80)	--	3 (0.90)	70 (21.02)	263 (78.98)	333 (100.00)	4033
Middle Hills	10 (3.19)	12 (3.82)	14 (4.46)	1 (0.32)	1 (0.32)	28 (8.92)	286 (91.08)	314 (100.00)	1685
Low Hills	22 (6.73)	20 (6.12)	17 (5.20)	4 (1.22)	7 (2.14)	70 (21.41)	257 (78.59)	827 (100.00)	7368
All Areas	75 (7.70)	50 (5.13)	27 (2.77)	5 (0.51)	11 (1.13)	168 (16.43)	814 (83.57)	974 (100.00)	4396

Further, the analysis revealed that a very low proportion of about 16 per cent farm households, consisting 21 per cent each in high and low hill areas as against only 9 per cent in middle hill areas are under the condition of indebtedness. If we considered the earlier analysis (Table 2.18) that 22 per cent households are not in a position to generate any surplus for saving and its future investment, it may be further pointed out that 16 per cent households are even not in a position to maintain their livelihood from the present earnings so they are forced to borrow certain amount of money to maintain their livelihood while another 6 per cent households find their available income just for maintaining their livelihood and remaining 78 per cent households are possessing the advantages of generating surplus income and undergoing for its savings. Average

amounts of borrowings per farm households varied lowest at Rs.1685 in middle hills to highest at Rs.7368 in low hills followed by Rs.4033 in high hills with an average of Rs.4398 for all farm groups of households together (Table 2.19). Across the households possessing different farm sizes, the per household amount of indebtedness averages highest from Rs.20229 for upper farm households to lowest at Rs.3516 for bottom farm households and it stands Rs.11712 for middle farm households.

Table 2.20: **Pattern of Indebtedness by Size of Holdings**

Size of Indebtedness (in Rs.'000)	Size of Holdings			
	Below 1.0	1.0 to 2.0	2.0 and Above	All Categories
Below 10	66 (7.48)	7 (8.97)	2 (25.00)	75 (7.70)
10 – 20	41 (4.64)	7 (8.97)	2 (25.00)	50 (5.13)
20 – 30	22 (2.49)	3 (3.85)	2 (25.00)	27 (2.77)
30 – 50	4 (0.45)	--	1 (12.50)	5 (0.51)
50 and Above	7 (0.79)	3 (3.85)	1 (12.50)	11 (1.13)
Total Households	140 (15.86)	20 (25.64)	8 (61.54)	168 (17.25)
Average Size of Indebtedness	3516	11712	20229	4896
Sample Households	883 (100.00)	78 (100.00)	13 (100.00)	974 (100.00)

Further, enquiring about the purpose-wise borrowing pattern of farm households the analysis presented in Table 2.21 depicts that the purchases of animals, and agricultural inputs are the two major heads which tend to farmers for undertaking loans from different sources.

Table 2.21: **Purpose of Borrowing of Households**

(Holdings in hectares)

Purpose of Borrowings	Size of Holdings			
	Below 1.0	1.0 to 2.0	2.0 and Above	All Categories
Vehicle	6 (4.29)	3 (15.00)	2 (25.00)	11 (6.55)
Fertilizers/Pesticides	38 (27.14)	1 (5.00)	4 (50.00)	43 (25.60)
Animals	54 (38.57)	2 (10.00)	--	56 (33.33)
House Construction	3 (2.14)	2 (10.00)	--	5 (2.98)
Seeds and Plants	18 (12.86)	11 (55.00)	1 (12.50)	30 (17.86)
Business	17 (12.14)	--	--	17 (10.12)
Others	4 (2.86)	1 (5.00)	1 (12.50)	6 (3.57)
Total	140 (100.00)	20 (100.00)	8 (100.00)	168 (100.00)

Significantly a larger proportion of households are borrowing money for purchasing animals (33.33 per cent) followed by purchasing of fertilizers and pesticides (25.60 per cent) and seeds and plants (17.86 per cent). Purchase of vehicles, construction of houses, establishment of trading activities and meeting the expenses of social ceremonies and festivals are the remaining purposes for undertaking loan of the farm households. However, the farm households possessing above 2 hectares land are observed undertaking loans only for the purpose of purchasing agricultural inputs and the purchase of vehicles. And the bottom farm households need to go for borrowing largely for purchasing animals followed by fertilizers and pesticides and establishing trading activities, though the purpose of borrowing of a highest proportion of medium size of farm households consisted for the purpose of purchasing seeds and plants.

Table 2.22: **Distribution of Households by Sources of Borrowings in Different Geographical Locations**

(Amount in Rs.)

Source of Borrowing of Households	Locations			
	High Hills	Middle Hills	Low Hills	All Areas
<u>Commercial Bank:</u>	12	14	44	70
(i) Household	(17.14)	(48.28)	(62.86)	(41.67)
(ii) Per Household	29409	20250	52284	42138
	(48.72)	(10.45)	(62.85)	(17.90)
<u>Rural Development:</u>	28	3	2	33
(i) Household	(40.00)	(10.34)	(2.86)	(19.64)
(ii) Per Household	30893	5250	16500	28390
	(44.88)	(2.71)	(19.83)	(12.06)
<u>Moneylenders:</u>	2	1	--	3
(i) Household	(2.86)	(3.45)	--	(1.79)
(ii) Per Household	3250	10000	--	5500
	(4.72)	(5.16)	--	(2.34)
<u>Friends/Relatives:</u>	--	1	--	1
(i) Household	--	(3.45)	--	(0.59)
(ii) Per Household	--	150000	--	150000
	--	(77.38)	--	(63.73)
<u>Co-operative Societies:</u>	28	9	24	61
(i) Household	(40.00)	(31.03)	(34.29)	(36.31)
(ii) Per Household	5286	8350	14404	9325
	(7.68)	(4.31)	(17.31)	(3.96)
<u>Indebted Total Amount:</u>	70	29	70	168
(i) Household	(100.00)	(100.00)	(100.00)	(100.00)
(ii) Per Household	68838	193850	83188	235352
	(100.00)	(100.00)	(100.00)	(100.00)

Note: Bracketed figures represent the percentages of raw totals.

It has generally been believed that the rural communities usually borrow their required finances for meeting certain demands from the moneylenders. However, in our analysis presented in Table 2.22 postulates that the Commercial Banks and Co-operative Societies are playing a dominant role in providing loans to the different farm groups of households in various geographical

locations. The proportion of households who obtained loan from Commercial Banks and Co-operative Societies accounted for 41.67 per cent and 36.31 per cent respectively. Though, the proportions of households obtaining loans from Co-operative Societies are registered significantly much higher in case of upper farm households while a fairly larger proportion of households among bottom farm households have acquired loan from Commercial Banks (41.43 per cent) followed by Co-operative Banks (34.29 per cent) and Rural Development Banks (21.43 per cent). And almost equal proportions of households (45 per cent) among middle farm households have obtained loan each from Co-operative Banks and Commercial Banks.

Moreover, the analysis has also been carried out in Tables 2.23 and 2.24 in connection to the availability pattern of different durable household items with the various farm groups of households as well as households located in different geographical locations. The concern analysis may highlight about the extent to which the persisting economic condition of different farm groups of households has been allowing them or making them in a position to acquire certain categories of expensive household durable.

Table 2.23: **Availability of Household Durables by Geographical Locations**

(Number of Households)

Items	Locations			
	High Hills	Middle Hills	Low Hills	All Areas
Television	119 (35.74)	149 (47.45)	225 (68.81)	493 (50.62)
Radio	145 (43.54)	164 (55.41)	143 (43.73)	462 (47.43)
Rape Recorder	23 (6.91)	14 (4.46)	57 (17.43)	94 (9.65)
Refrigerator	--	1 (0.32)	52 (15.90)	53 (5.44)
Motor Cycle	--	--	106 (32.42)	106 (10.88)
Cycle	--	2 (0.64)	27 (8.26)	29 (2.98)
Households Possessing Durable	207 (62.16)	237 (75.48)	284 (86.85)	729 (74.85)
Households not possessing any Durable	126 (37.84)	77 (24.52)	42 (12.84)	245 (25.15)
Total Households	333 (100.00)	314 (100.00)	327 (100.00)	974 (100.00)

The only durable items available in the possession of farm households are television, tape-recorder, radio, refrigerator, motor cycle and cycle. Around 75 per cent of households, consisting 86.85 per cent in low hills, 75.48 per cent in middle hills and 62.16 per cent in high hills are noted possessing at least a single item among the above listed items. However, the proportion of households possessing relatively larger expensive items such as television, refrigerator and motor

cycle are fairly higher in high hills as compared to middle and low hill areas. In fact, the proportion of households possessing television in high hill areas are noted around 36 per cent as against 47 per cent and 69 per cent households comprising in middle and low hill areas respectively. Even none of the households in high hill areas and around 0.32 per cent households in middle hill areas as against 48 per cent households in low hill areas are found possessing a very expensive items such as refrigerator and motor cycle.

Table 2.24: **Availability of Household Durables by Size of Holdings**

(Households in '000)

Items	Number of Household Size of Holdings			
	Below 1.0	1.0 – 2.0	2.0 and Above	All Groups
Television	424 (48.02)	58 (74.36)	11 (84.62)	493 (50.62)
Radio	412 (11.66)	45 (57.69)	5 (38.46)	462 (47.43)
Rape Recorder	78 (18.93)	10 (12.82)	6 (46.15)	94 (9.65)
Refrigerator	40 (19.42)	6 (7.69)	7 (53.85)	53 (5.44)
Motor Cycle	92 (22.33)	8 (10.26)	6 (46.15)	106 (10.88)
Cycle	29 (7.04)	--	--	29 (2.98)
Households Possessing Durable	644 (72.93)	75 (96.15)	10 (76.92)	729 (74.85)
Households not possessing any Durable	239 (27.07)	3 (3.85)	3 (23.08)	245 (25.15)
Total Households	883 (100.00)	78 (100.00)	13 (100.00)	974 (100.00)

Considering into account the availability pattern of different durable items among different farm groups of households it appears that the proportion of households possessing relatively higher expensive items such as television, refrigerator and motor cycle are relatively larger among upper farm households as compared to middle and low farm groups of households. Even the lowest expensive item such as cycles are owned by only lowest farm groups of households and the proportion of households possessing very expensive items such as television accounted for 85 per cent among the upper farm households as against 74 per cent middle and 48 per cent bottom farm households.

LIVING CONDITION

(a) **Housing Condition**

Examination of the housing condition and the accessibility situation to different necessary infrastructural facilities have been generally considered to be important elements in view of assessing the living standard of the households. In this context, a detailed analysis undertaken in Tables 2.25 and 2.26 reveal that all households, possessing either small or large size of holdings and are economically poor or rich, have constructed pucca houses in different geographical locations. Only the differences in the quality of housing are that the roofing of some houses is cemented and others are made of through the large slices of stones. The proportion of houses constructed through using cement accounted around 48 per cent, comprising fairly large in high hills (73 per cent) followed by 46 per cent in middle hills and at lowest proportion of 24 per cent in low hills.

Table 2.25: **Housing Conditions of the Household in Different Geographical Locations**

Housing Facilities	Locations			
	High Hills	Middle Hills	Low Hills	All Areas
<u>Number of Rooms</u>	114	92	119	325
Below 2	(34.23)	(29.30)	(36.39)	(33.37)
3	72	75	89	236
	(21.62)	(23.89)	(27.22)	(24.23)
4	76	90	81	247
	(22.82)	(28.66)	(24.77)	(25.36)
Above 5	71	57	38	166
	(21.32)	(18.15)	(11.62)	(17.04)
<u>Separate Kitchen</u>	80	151	203	434
Yes	(24.02)	(48.09)	(62.08)	(44.56)
No	253	163	124	540
	(75.98)	(51.91)	(37.92)	(55.44)
<u>Roofing</u>	91	169	248	508
Kutcha	(27.33)	(53.82)	(75.84)	(52.16)
Cemented (Pucca)	242	145	79	466
	(72.67)	(46.18)	(24.16)	(47.84)
<u>Bathroom</u>	91	144	217	452
Yes	(27.33)	(45.86)	(66.36)	(46.41)
No	242	170	110	522
	(72.67)	(54.14)	(33.64)	(53.59)
<u>Electricity</u>	124	217	284	625
Yes	(37.24)	(69.11)	(86.85)	(64.17)
No	209	97	43	349
	(62.76)	(30.89)	(13.15)	(35.83)
Total Households	333	314	327	974
	(100.00)	(100.00)	(100.00)	(100.00)

Note: Figures in brackets represent the percentage to row totals.

Further it has been pointed out that a little over one-third of households, 36 per cent in low hills, 34 per cent in high hills and 29 per cent in middle hills are possessing two and one room accommodations, in fact in the houses of over 17 per cent households the size of accommodation consisted as larger of above 5 rooms. Similarly the households to have the facility of separate kitchen accounted for around 45 per cent, consisting 62 per cent in low hills, 48 per cent in middle hills and 24 per cent in high hills. The households to have constructed bathroom are registered 46.41 per cent, against a fairly larger proportion of households in low hills (66.36 per cent) followed by middle hills (45.86 per cent) and low hills (27.33 per cent). As far as the availability situation of electricity facility in the houses of farm households in different geographical locations is concerned the analysis depicts that in all 64 per cent of the houses are connected with the facility of electricity, though the proportions of households acquiring concerned facility are largely varying across the different geographical locations. Since, the facility of electricity has been reached to a greater level in low hill areas followed by middle hill areas while most villages in high hill areas are still lacking this facility. As the consequences, the proportion of households availing the facility of electricity are reflected varying accordingly across the different geographical locations, 37 per cent for high hills, 69 per cent for middle hills and 87 per cent for low hills (Table 2.25).

Table 2.26: **Housing Conditions of the Households According to their Size of Holdings**
(Holdings in hectares)

Housing Facilities	Size of Holdings			
	Below 1.0	1.0 – 2.0	2.0 and Above	All Categories
Number of Rooms	318	6	1	325
Below 2	(36.01)	(7.69)	(7.69)	(33.37)
3	225	10	1	236
	(25.48)	(12.82)	(7.69)	(24.23)
4	221	22	4	247
	(25.03)	(28.20)	(30.77)	(25.36)
Above 5	119	40	7	166
	(13.48)	(51.28)	(53.85)	(17.04)
Separate Kitchen	376	47	11	434
Yes	(42.58)	(60.26)	(84.61)	(44.56)
No	507	31	2	540
	(57.42)	(39.74)	(15.39)	(55.44)
Roofing	454	41	13	508
Kutcha	(51.42)	(52.56)	(100.00)	(52.16)
Cemented (Pucca)	429	37	—	466
	(48.58)	(47.44)		(47.84)
Bathroom	392	47	13	452
Yes	(44.39)	(60.26)	(100.00)	(46.41)
No	491	31	—	522
	(55.61)	(39.74)		(53.59)
Electricity	553	59	13	625
Yes	(62.63)	(60.26)	(100.00)	(64.17)
No	330	19	—	349
	(37.37)	(39.74)		(35.83)
Total Households	883	78	13	974
	(100.00)	(100.00)	(100.00)	(100.00)

Note: Figures in brackets represent the percentages to row totals.

Further the analysis reveals that the housing conditions in terms of the size structure of accommodation, quality of houses and availability pattern of various facilities among the houses of different farm households is seen largely determined by the size of land area the concerned households are possessing. Since the proportion of households reported acquiring the accommodation size of above 5 rooms are around 54 per cent among larger farm groups as against only 13 per cent among bottom farm groups. Accordingly, the proportion of households have the advantage of separate kitchen facility accounted for 85 per cent and 43 per cent among larger and bottom farm groups of households respectively. In fact every households among the larger farm groups are owing the facility of both room and their houses are connected the facility of electricity while the proportions of households possessing concerned facilities among bottom farm group are noted to be 44 per cent and 63 per cent respectively.

In regards to the availability situation of drinking water facilities it has generally been argued that in spite several river originating from high mountain and passing through almost the locations of the State the scarcity of water is highly prevailing in most of the hilly areas of the State. In the past water originated from the springs and rocks and the ground water originated in the ponds had been the main sources of drinking water in almost the areas but due to increasing depletion of natural resources coupled with increasing deforestation over the years the availability of water from different sources has reduced to a significant level during the recent past.

Table 2.27: **Distribution of Households by the Situation of Water Supply in Different Locations**

Nature of Water Supply	Locations			
	High Hills	Middle Hills	Low Hills	All Areas
<u>Source of Water Supply</u>	27	28	116	171
Tap Inside the House	(8.11)	(8.92)	(35.77)	(17.56)
Tap (Public)	102	158	167	427
	(30.63)	(50.32)	(51.07)	(43.84)
River Water	1	2	--	4
	(0.30)	(0.96)		(0.41)
Public Well/Pond	203	125	44	372
	(60.96)	(39.81)	(13.46)	(38.19)
<u>Distance Covered for Obtaining Public Water Facility (in Kms.)</u>	267	269	211	747
Below 1	(80.18)	(85.67)	(64.53)	(76.69)
1 - 2	39	11	--	50
	(11.71)	(3.50)		(5.13)
2 and Above	--	6	--	6
		(1.91)		(0.62)
Total Households	306	286	211	803
	(91.89)	(91.08)	(64.83)	(82.44)
Total Households	333	314	327	974
	(100.00)	(100.00)	(100.00)	(100.00)

Note: Figures in brackets represent the percentages to row totals.

However, based on our analysis it revealed that the common sources of obtaining drinking water are public taps, locally known as dharas, of a majority of the households (44 per cent) followed by public ponds and wells (38 per cent). The safe water through tap is available in the houses of only 18 per cent households. The public ponds as the sources of obtaining water are indicated more common in high hill areas and the concerned source of water becomes less common while proceeding to middle and then in low hill areas. In middle and low hill areas the major sources of water for households are the public taps. And the households reported to have safe water facility inside their houses are found significantly a larger proportion in low hill areas (36 per cent) and around equal proportion of 8 per cent each in middle and low hill areas.

Table 2.28: **Distribution of Households by the Situation of Water Supply by Size of Holdings**

Nature of Water Supply	(Holding in hectares)			
	Size of Holdings			
	Below 1.0	1.0-2.0	2.0 and Above	All Groups
<u>Source of Water Supply</u>	141	18	12	171
Tap Inside the House	(15.97)	(23.08)	(92.31)	(17.56)
Tap (Public)	386	41	--	427
	(43.71)	(52.56)		(43.84)
River Water	4	--	--	4
	(0.45)			(0.41)
Public Well/Pond	352	19	1	372
	(39.86)	(24.36)	(7.69)	(38.19)
<u>Distance Covered for Obtaining Public Water Facility (in Kms.)</u>	686	60	1	747
Below 1	(77.69)	(76.82)	(7.69)	(76.69)
1 - 2	50	--	--	50
	(5.66)			(5.13)
2 and Above	6	--	--	6
	(0.68)			(0.62)
Total Households	742	60	1	803
	(84.03)	(76.92)	(7.69)	(82.44)
Total Households	883	78	13	974
	(100.00)	(100.00)	(100.00)	(100.00)

Note: Figures in brackets represent the percentages to row totals.

In obtaining the public water facilities, which available through taps and ponds, over three-fourth proportion of households, comprising 86 per cent in middle hills followed by 80 per cent in high hills and 65 per cent in low hills, have to cover less than one kilometre and only less than one per cent households are covering the distance of above 2 kilometres. Over and above, the problem in obtaining water has not been seen so serious in sample areas in low hill areas compared to the rural areas of the other States as a majority of households are still obtaining the drinking water through their traditional means of tap (dhara) and ponds, in fact the safe water through tap has also been access to at least some proportions of households. Even the average distance that

the rural households are covering for obtaining water facility should also be considered very nominal and the water is accessible to 99 per cent households through covering the distance of less than 2 kms. in different locations.

It has further recognized that the proportions of households who has arranged water facility through personal taps are fairly much larger among larger farm households (92 per cent) as compared to middle (23 per cent) and bottom (16 per cent) group of farm households. In fact none of the households among larger farms is obtaining drinking water either from public taps or the rivers while the public tap is a major source of drinking water for both bottom and middle farm group households. Even, the households those are forced to cover over 2 kms. for obtaining their drinking water requirement are only noted from the bottom farm groups.

(b) **Consumption Pattern**

It has generally been believed that as the consequences of a very low amount of incomes that the marginal farmers usually derive from their marginal lands they can hardly afford to maintain a very high level of living standard. However, the marginal farmers in Uttaranchal are recognized maintaining reasonably a better living standard if we take into account the quality and conditions of their housing, accumulation pattern of different infrastructural facilities in their houses and various amenities of life which they are enjoying. But the kind of living standard that the marginal farmers have been maintaining in the State is not the consequences of their agricultural incomes rather it is the outcome of income is being originated from various non-farm activities and animal husbandry.

Per household consumption expenditure, which include both the value of home produced items and the value of purchased items has also been estimated as higher at Rs.36.6 thousand, though it varied marginally for the farm households in different geographical locations, low hills Rs.37.5 thousand, middle hills Rs.36.1 thousand and high hills Rs.36.3 thousand. Similarly, the value of per capita consumption ranges lowest from Rs.6075 in high hills to highest at Rs.6834 in low hills, with the average amount of Rs.6444 for all households.

Table 2.29 provides a detailed analysis on the pattern of expenditure of farm households on different food and non-food items. Per household average expenditure on the consumption of food items seems to be relatively higher as compared on the consumption of non-food items, especially in high hill areas. Purchase of foodgrains and animal produce such as milk, ghee, eggs and meat are the major heads of expenditure for households in each of the geographical locations. The share of expenditure of farm households in their two heads together is accounted to be over 38 per cent,

In fact, it is as large as 40 per cent in high hills. Per household average expenditure on the purchase of foodgrains and animal produce is noted to be Rs.7239 and Rs.6352 respectively.

Table 2.29: **Consumption Pattern of Households by Locations**
(Per Household Value Expenditure in Rs.)

Heads of Expenditure	Locations			
	High Hills	Middle Hills	Low Hills	All Areas
A. Food Items	19001 (52.37)	17993 (49.78)	18719 (49.98)	18602 (50.76)
Foodgrains	7863 (21.67)	7184 (19.88)	6608 (17.64)	7239 (19.75)
Oil and Oil Products	1463 (4.03)	1419 (3.93)	1946 (5.20)	1611 (4.40)
Vegetables and Fruits	2005 (5.52)	2624 (7.26)	2441 (6.52)	2353 (6.42)
Animal Produce	6601 (18.19)	5786 (16.01)	6635 (17.72)	6352 (17.33)
Sugar	1069 (2.95)	980 (2.71)	1089 (2.91)	1047 (2.86)
B. Non-Food Items	17284 (47.63)	18151 (50.22)	18732 (50.02)	18047 (49.24)
Clothing	3911 (10.78)	3974 (11.00)	4404 (11.76)	4097 (11.18)
Education	1673 (4.61)	1973 (5.46)	2429 (6.49)	2024 (5.52)
Medical	2479 (6.83)	2383 (6.59)	2187 (5.84)	2350 (6.41)
Fuels	2281 (6.29)	2902 (8.03)	4124 (11.01)	3101 (8.46)
Others (Social ceremonies, festivals, etc.)	6940 (19.13)	6919 (19.14)	5588 (14.92)	6475 (17.67)
Total	36285 (100.00)	36144 (100.00)	37451 (100.00)	36649 (100.00)
Per Capita	6075	6463	6834	6444

Note: Figures in brackets represent the percentage to row totals.

Similarly, per household annual consumption expenditure on non-food items comes around Rs.18047 and the corresponding amount of expenditure ranges from lowest at Rs.17284 for household in high hills to highest at Rs.18732 for households in low hills. Looking into the expenditure pattern of households on the purchase of different food and non-food commodities together it revealed that per household average expenditure on performing various local level festivals, social ceremonies and related activities is estimated comparatively much larger at Rs.6475 than in the remaining heads of expenditure. Expenditure involved in the purchase of clothing has been noted as the second most important head while the per household consumption expenditure

on remaining items ranges between Rs.2024 to Rs.3105, respectively for education and fuel items, included as electricity, gas and kerosene.

Table 2.30: **Consumption Pattern of Households by Size of Holdings**

Heads of Expenditure	(Per Household Value of Expenditure in Rs.) Size of Holdings			
	Below 1.0	1.0 – 2.0	2.0 and Above	All Groups
A. Food Items	17728 (51.18)	26259 (47.98)	31790 (49.28)	18602 (50.76)
Foodgrains	6946 (20.05)	9978 (18.23)	10622 (16.47)	7239 (19.75)
Oil and Oil Products	1467 (4.24)	2891 (5.28)	3689 (5.72)	1611 (4.40)
Vegetables and Fruits	2219 (6.41)	3279 (5.99)	5791 (8.98)	2353 (6.42)
Animal Produce	6085 (17.57)	8750 (15.99)	10031 (15.55)	6352 (17.33)
Sugar	1011 (2.92)	1361 (2.49)	1657 (2.57)	1047 (2.86)
B. Non-Food Items	16910 (48.82)	28470 (52.02)	32720 (50.72)	18047 (49.24)
Clothing	3921 (11.32)	5609 (10.25)	7000 (10.85)	4097 (11.18)
Education	1917 (5.53)	2806 (5.13)	4569 (7.08)	2024 (5.52)
Medical	2224 (6.42)	3705 (6.77)	2823 (4.38)	2350 (6.41)
Fuels	2897 (8.36)	4644 (8.49)	7662 (11.88)	3101 (8.46)
Others (Social ceremonies, festivals, etc.)	5951 (17.18)	11706 (21.39)	10666 (15.53)	6475 (17.67)
Total	34638 (100.00)	454729 (100.00)	64510 (100.00)	36649 (100.00)
Per Capita	6198	8338	9116	6444

Note: Figures in brackets represent the percentage to row totals.

Further, a clear cut differences in per household consumption expenditure are observed strongly prevailing among the households possessing different size of land holdings. The pattern of consumption expenditure of different farm households is highly related with the size of land the concerned households are possessing. Per household average consumption expenditure on different items together registered at Rs.64510 for upper farm households as against Rs.54729 for middle and Rs.34638 for bottom groups of farm households. Similarly, per capita consumption expenditure for upper farm households as reported to be as higher at Rs.9116 followed by Rs.8338 for middle and Rs.6198 for bottom farm groups of households. This indicates that the upper farm

households are in a position to spend around 47 per cent more amount as compared to bottom farm households and 9.33 per cent amount as compared to middle farm households on the purchase of different items. Similarly, the share of expenditure of upper and middle farm households is seen relatively higher in favour of the consumption of non-farm commodities as compared to food items. While the reversal situation is seen emerging in the cases of bottom farm households. Among the various food items the foodgrains and animal produce are noted as the important consumption commodities of each farm groups of households. However, per household expenditure on both the groups of main consumption commodities is in accordance to the pattern of land available with the households. Concerning to the expenditure pattern of different farm households on the consumption of various non-food commodities the analysis depicts that the celebration of social ceremonies, festivals and related activities and expenditure involved in clothing are the major consumption heads of each farm households, though the share of expenditure on concerned head varied lowest from 19.68 per cent for bottom farm households to highest at 26.38 per cent for upper and 31.64 per cent for middle farm of households.

A detailed analysis has further been carried out regarding the contribution of domestically produced commodities of different farm households in their total consumption expenditure. The home produced commodities of farm households include various foodgrains, oilseeds, vegetables, fruits, sugarcane and animal produce, such as, milk, ghee and meat. However, excepting the case of sugarcane all listed commodities are directly consumed and the surplus is sold out but the farmers sell out the whole quantum of sugarcane and then required quantity of sugar is purchased by them later on. On an average the farm households are in a position to generate only 22.77 per cent of their consumption requirements from their available farms and animals, though the corresponding share of home produced commodities ranges lowest from 18.23 per cent in bottom farm households to highest at 27.19 per cent in upper farm households. The millet crops such as madua, bajra and zungara are the only farm produced which production seems to be adequate to meet the consumption requirement of the farm households especially in high and middle hill areas. The contribution of home produced commodities in the total consumption requirement of farm households has been indicated to be significantly highest at 86.28 per cent for milk and milk products followed by 51 per cent for pulses, 46 per cent for wheat, 32.31 per cent for vegetables and 30.47 per cent for rice. Moreover, the overall contribution of all foodgrains in the total consumption requirements of farmers is noted only around 42 per cent, in fact, it is as lower at 21 per cent in high hill areas, though the corresponding contribution registered over 67 per cent in the low hills (Table 2.31). Thus, it may be pointed out that the average hill farmers are not in a position to produce even one half of his food requirement from his farm.

Table 2.31: **Share of Domestic Produced in Aggregate Consumption Expenditure in Different Geographical Locations**

(Per Household Value in Rs.)

Items	High Hills			Middle Hills			Low Hills			All Areas		
	Purchased	Home Produced	Total	Purchased	Home Produced	Total	Purchased	Home Produced	Total	Purchased	Home Produced	Total
Rice	3146 (92.48)	356 (7.52)	3502 (100.0)	2192 (74.28)	759 (25.72)	2951 (100.0)	840 (34.38)	1603 (65.62)	2443 (100.0)	2065 (69.53)	905 (30.47)	2970 (100.0)
Wheat	2040 (82.03)	447 (17.97)	2487 (100.0)	1326 (57.73)	971 (42.27)	2297 (100.0)	500 (21.29)	1849 (78.71)	2349 (100.0)	1293 (54.33)	1087 (45.67)	2380 (100.0)
Mandus	--	75 (100.0)	75 (100.0)	--	78 (100.0)	78 (100.0)	--	--	--	--	66 (100.0)	66 (100.0)
Pulses	1038 (62.55)	621 (37.45)	1659 (100.0)	653 (37.40)	1110 (62.96)	1763 (100.0)	822 (47.60)	906 (53.43)	1728 (100.0)	841 (49.04)	874 (50.96)	1715 (100.0)
Other Food grains	--	140 (100.0)	140 (100.0)	--	95 (100.0)	95 (100.0)	--	88 (100.0)	88 (100.0)	--	108 (100.0)	108 (100.0)
Total Food-grains	6224 (79.16)	1639 (20.84)	7863 (100.0)	4171 (58.06)	3013 (41.94)	7184 (100.0)	2162 (32.72)	4446 (67.28)	6608 (100.0)	4199 (58.01)	3040 (41.99)	7239 (100.0)
Oil & Oil Products	1356 (92.69)	107 (7.31)	1463 (100.0)	1067 (75.19)	352 (24.81)	1419 (100.0)	1371 (70.45)	575 (29.55)	1946 (100.0)	1268 (78.71)	343 (21.29)	1611 (100.0)
Milk & Milk Products	647 (13.15)	4272 (86.85)	4919 (100.0)	630 (13.86)	3914 (86.14)	4544 (100.0)	774 (14.08)	4723 (85.92)	5497 (100.0)	685 (7.71)	4308 (86.28)	4993 (100.0)
Eggs and Meats	1658 (98.57)	24 (1.43)	1682 (100.0)	1242 (100.0)	--	1242 (100.0)	1130 (99.30)	8 (0.70)	1138 (100.0)	1347 (99.19)	11 (0.81)	1358 (100.0)
Vegetables	895 (75.91)	284 (24.09)	1179 (100.0)	851 (50.15)	846 (49.85)	1697 (100.0)	1108 (81.53)	251 (18.47)	1359 (100.0)	953 (67.69)	455 (32.31)	1408 (100.0)
Fruits	538 (65.13)	288 (34.87)	826 (100.0)	838 (90.40)	89 (9.60)	927 (100.0)	902 (83.36)	180 (16.64)	1082 (100.0)	757 (80.11)	188 (19.89)	945 (100.0)
Others	18353 (100.0)	--	18353 (100.0)	19131 (100.0)	--	19131 (100.0)	19821 (100.0)	--	19821 (100.0)	19095 (100.0)	--	19095 (100.0)
Total	29671 (81.77)	6614 (18.23)	36285 (100.0)	27930 (77.27)	8214 (22.73)	36144 (100.0)	27268 (72.81)	10183 (27.19)	37451 (100.0)	28301 (77.33)	8345 (22.77)	36649 (100.0)
Per Capita	4967	1108	6075	4994	1469	6463	4970	1864	6834	4977	1467	6444

Note: Figures in brackets represent the percentage to row totals.

Across different farm groups of households the contribution of home produced commodities in the gross value of consumption is however significantly well related with the size of land holdings of farm households though each of the farm households are seen making at least some purchases due to the insufficiency of home produced commodities to sustain their requirement. The percentage share of home produced commodities in the total value of consumption ranges between

22.25 per cent to 31 per cent respectively for bottom and upper farm households and the corresponding share accounted for 24.95 per cent for medium farm households. Per capita annual expenditure on the purchase of consumption items from the market varied highest from Rs.6319 for upper farm households to lowest at Rs.4819 for bottom and Rs.6258 for medium farm households. Revealed differences in per capita value of market purchased and the relatively higher value of market purchased in favour of upper farm households is attributed largely their fairly higher consumption expenditure on the purchase of food and non-food commodities. However, it has to be noted that the share expenditure on the purchase of food and non-food together is negatively related to the farm size continuum, i.e., it is highest at 78 per cent for bottom farm households, 75 per cent for medium and 69 per cent for upper farm households.

Table 2.32: Share of Domestic Produced in Aggregate Consumption Expenditure of Different Farm Households
(Holdings in Hect. and Value in Rs.)

Items	Below 1.0			1.0 - 2.0			2.0 and Above			All Areas		
	Purchased	Home Produced	Total	Purchased	Home Produced	Total	Purchased	Home Produced	Total	Purchased	Home Produced	Total
Rice	2083 (71.61)	826 (28.39)	2909 (100.0)	2063 (57.10)	1550 (42.90)	3613 (100.0)	846 (36.23)	2379 (73.79)	3225 (100.0)	2065 (69.53)	905 (30.47)	2970 (100.0)
Wheat	1311 (57.45)	971 (42.55)	2282 (100.0)	1228 (39.28)	1898 (60.72)	3126 (100.0)	431 (9.51)	4100 (90.49)	4531 (100.0)	1293 (54.33)	1087 (45.67)	2380 (100.0)
Mandus	-	62 (100.0)	62 (100.0)	-	118 (100.0)	118 (100.0)	-	32 (100.0)	32 (100.0)	-	66 (100.0)	66 (100.0)
Pulses	834 (52.26)	762 (47.74)	1596 (100.0)	809 (27.99)	2081 (72.01)	2890 (100.0)	1519 (55.14)	1236 (44.86)	2755 (100.0)	841 (49.04)	874 (50.96)	1715 (100.0)
Other Food grains	-	97 (100.0)	97 (100.0)	-	231 (100.0)	231 (100.0)	-	79 (100.0)	79 (100.0)	-	108 (100.0)	108 (100.0)
Total Food-grains	4228 (60.87)	2718 (39.13)	6946 (100.0)	4100 (41.09)	5878 (58.91)	9978 (100.0)	2796 (26.32)	7826 (73.68)	10622 (100.0)	4199 (58.01)	3040 (41.99)	7239 (100.0)
Oil & Oil Products	1187 (80.91)	280 (19.09)	1467 (100.0)	2099 (72.61)	791 (27.36)	2891 (100.0)	1769 (47.95)	1920 (52.05)	3689 (100.0)	1268 (78.71)	343 (21.29)	1611 (100.0)
Milk & Milk Products	670 (13.89)	4153 (86.11)	4823 (100.0)	843 (12.95)	5669 (87.05)	6512 (100.0)	746 (10.08)	6654 (89.92)	7400 (100.0)	685 (7.71)	4308 (86.28)	4993 (100.0)
Eggs and Meats	1250 (99.05)	12 (0.95)	1262 (100.0)	1042 (52.63)	938 (47.37)	1980 (100.0)	1350 (65.85)	700 (34.15)	2050 (100.0)	1347 (99.19)	11 (0.81)	1358 (100.0)
Vegetables	939 (69.71)	408 (30.29)	1347 (100.0)	1042 (52.63)	938 (47.37)	1980 (100.0)	1350 (65.85)	700 (34.15)	2050 (100.0)	953 (67.69)	455 (32.31)	1408 (100.0)
Fruits	738 (84.63)	134 (15.37)	872 (100.0)	922 (70.98)	377 (29.02)	1299 (100.0)	1050 (28.07)	2691 (71.93)	3741 (100.0)	757 (80.11)	188 (19.89)	945 (100.0)
Others	17921 (100.0)	-	17921 (100.0)	29832 (100.0)	-	29832 (100.0)	34377 (100.0)	-	34377 (100.0)	19095 (100.0)	-	19095 (100.0)
Total	26933 (77.76)	7705 (22.24)	34638 (100.0)	41078 (75.05)	13654 (24.95)	54730 (100.0)	44719 (69.32)	19791 (30.68)	64510 (100.0)	283011 (77.33)	8345 (22.77)	36649 (100.0)
Per Capita	4819 (79.75)	1379 (22.25)	6198 (100.0)	6258 (75.01)	2080 (24.99)	8338 (100.0)	6319 (69.36)	2797 (30.76)	9116 (100.0)	4977 (77.24)	1467 (22.76)	6444 (100.0)

Note: Figures in brackets represent the percentage to row totals.

The contribution of domestically produced foodgrains in the total consumption requirements of different farm groups of households varied lowest at 39.13 per cent for bottom farm households to highest at 73.68 per cent for upper and 58.91 per cent for medium farm households. It means the total quantum of foodgrain production available in almost the farm categories is much below the level of total consumption requirement of different size groups of farm households. And the quantity of surplus production of various foodgrains as being generated by few numbers of households seems to be almost a negligible proportion of the total quantum of foodgrains production and much below the quantum of foodgrains that has been purchased from the market for consumption purposes.

The foodgrains such as wheat, rice and pulses are the main consumption commodities of farm households in different areas, though a significant level of differentials are existing in the per household consumption expenditure on these main food products among different farm continuum. Also the quantum of various foodgrains being generated from the available different size of farms is recognized much below the level of the consumption requirement of its farm households. Even the upper farm groups of households are in a position to produce around 74 per cent of food requirement, consisting of 90 per cent wheat, 73 per cent rice and 45 per cent pulses. from their available lands. Similarly, the bottom farm groups of households could hardly generate 39 per cent of their food requirement from their farms. In this sense the marginality situation of farming system in almost the geographical locations has been well recognized irrespective of the size of land holdings which the farm households are possessing. At the same time it has also to be considered the fact some household even the bottom farm households in low hill areas are generating at least some quantity of surplus food-grains for sale from their farms by virtue of the availability of a very productive and fertile land.

CHAPTER III

STRUCTURE OF ANIMAL HUSBANDRY

In the context of mountain and hilly farming system, the agriculture means all land based activities comprising of cereal production, food and non-food crop production, fruits and vegetable farming, animal husbandry and their supporting services (Pratap, 1998). Very often all these activities extend on to pastures, range-lands and into forestry areas to the extent that they are used as support lands. The bio-physical and socio-economic conditions of mountain environment have been instrumental in the evaluation of a range of agricultural system such as swidden farming, perennial plantations and agro-pastorism to pastoralism (Jodha, 1990). In this extremely a greater forward and backward linkages in operational system of various agricultural activities may be well recognized in the emerging farming system of the mountains.

Thus, the significance of crop-mixed animal husbandry should be considered as the crucial alternative option for improving the livelihood situation of mountain farming households in the sense that these regions are lacking adequate arable land for cultivation and even in a situation of maximising the use of available limited land under the cultivation of high value commercial crops is expected will hardly be sufficient to sustain the livelihood of the farming communities. These facts were well proved in Chapter II while an assessment was undertaken in connection to the contribution of different sources of income in the total income of various farm households. The animal husbandry had been recognized as the second most important source of income after the production of food and non-food crops of all farm groups of households.

A large area of land under forests, the availability of large grazing areas and pasture lands and a variety of forest inter-mixed with big and small stretches of grass have provided considerable scope for promoting animal husbandry in the State. Since the animal husbandry does not require a very higher amount of maintenance cost, as fodder is largely obtained from nearby forests and common land without making any payment of its collection, every category of farm households can opt the concerned activity. Advantages of animal husbandry do not lie only in terms of income generation aspects but its significant importance has also been recognized for

meeting the fertilizer demands of farm households, use of bullocks for ploughing, spiritual importance of cows and the use of certain animals as the means of transportation.

According to 1997 livestock census, the populations of livestock and poultry were 40.01 lakhs and 9.71 lakhs respectively. However, the population of draft buffaloes, milch cows, bullocks and young stock cattle declined and those of milch buffaloes, sheeps, goats, young buffaloes and other animals such as horses, donkeys and mules increased between the period 1993 and 1997. The value of cows for the production of bullocks as draught animals is declining due to decreasing land holding sizes, rendering the maintenance of bullocks for draught purposes uneconomical. Accordingly decreasing the population of cows has also adversely affected the growth pattern of bullock population. Hill cows are not good milch animals as their yield rates are much smaller than those of buffaloes. Considerable increase in the population of milch buffaloes could be attributed as a result of decreased population of cows. It is in the context that there is a tradition of keeping at least one milch animal either cow or the buffalo of the households prevailing in every part of the State for last several centuries. An overwhelming increasing trend reflecting in the population of sheep and goats over the years could be attributed as a result of the successfully implementation of Intensive Sheep Development Project introduced by the State Government in 1976. The continued accessibility problems in most part of the hill areas and the horses, mules and donkeys being only the alternative means of transportation their population has been constantly increasing over the years.

Table 3.1: **Situation of Animal Husbandry**

Animal	Year		Percentage Change
	1993	1997	
Milch Buffaloes	352107 (8.54)	402876 (8.95)	14.41
Buffalo (Draft)	325615 (7.90)	313782 (6.97)	— 3.63
Milch Cow	375055 (9.10)	356876 (7.93)	— 4.84
Bullock	812502 (19.71)	731483 (16.25)	— 9.97
Sheep	241397 (5.86)	310705 (6.90)	28.71
Goat	799877 (19.40)	1070020 (23.77)	33.77
Buffalo (Young Stock)	362600 (8.80)	377755 (8.39)	4.17
Cattle (Young Stock)	631933 (15.33)	625876 (13.90)	— 0.95
Other Animals	221363 (5.37)	312115 (6.93)	40.99
Total Animals	4122449 (100.0)	4501488 (100.0)	9.19
Birds	761367	97112 2	27.54
Total Birds & Animals	4883816	54726 10	12.05

Source: Revenue Department, Livestock Census, Lucknow, Government of U.P.

Moreover, in the total population of livestock the share of goats is as higher as 24 per cent, and irrespective of a considerable declining trend revealed in the population of bullocks, their share is still 16.25 per cent and ranked second after the share of goats. The share of sheep has increased from 5.86 per cent in 1993 to 6.90 per cent in 1997. Rearing of sheep and goat has been recognized a very economic activity. The wool obtained from sheep and goat is used locally for spinning and weaving blankets, shawls, sweaters, carpets and various other woolen goods.

Based on primary data collected in connection of structure of animal husbandry from different sample areas the situation in terms of share of different livestock population is emerging almost at similar pattern as revealed through analysing the secondary data obtained from the livestock census. Since the population of buffaloes, sheeps, young buffaloes and the animals used for transportation purposes such as mules, horses and donkeys increased during the recent past while the population growth of cattle has declined substantially and it has remained almost stagnant for bullocks between the period 1997 to 2002. The use of both sheep and goat is undertaken for obtaining wool while the productivity of sheep is much higher than that of goat.

Table 3.2: Structure of Animal Husbandry in Different Geographical Locations

Livestock Category	High Hills			Middle Hills			Low Hills			All Areas		
	1997	2002	% Growth	1997	2002	% Growth	1997	2002	% Growth	1997	2002	% Growth
Cattle	423 (26.31)	325 (20.95)	-23.17	394 (26.95)	271 (19.81)	-31.22	327 (31.38)	309 (28.02)	5.51	1144 (27.82)	905 (22.17)	-20.89
Buffaloes	159 (9.89)	230 (14.83)	44.65	192 (13.93)	248 (18.13)	29.17	221 (21.21)	259 (23.48)	17.20	572 (13.91)	737 (18.06)	28.85
Sheep	41 (2.55)	55 (3.55)	31.14	—	—	—	—	—	—	41 (1.00)	55 (1.35)	34.15
Goat	459 (28.55)	395 (25.47)	-13.94	276 (18.88)	213 (15.57)	-22.83	104 (9.98)	88 (7.98)	-15.39	839 (20.40)	696 (17.05)	-17.04
Bullocks	211 (13.12)	209 (13.48)	-0.94	295 (20.18)	305 (22.30)	3.39	144 (13.82)	136 (12.33)	-5.56	650 (15.81)	650 (15.92)	±0
Horses, Mules & Donkeys	20 (1.24)	35 (2.26)	75.00	12 (0.82)	18 (1.32)	33.33	—	—	—	32 (0.78)	53 (1.30)	65.63
Young Buffaloes	115 (7.15)	102 (6.58)	-11.30	102 (6.98)	127 (9.28)	24.51	135 (12.96)	178 (16.14)	31.85	352 (8.56)	407 (9.97)	15.63
Young Cattle	180 (11.19)	200 (12.90)	11.11	191 (13.06)	186 (13.60)	-2.62	111 (10.65)	133 (12.06)	19.82	482 (11.72)	579 (14.18)	20.12
Total Animals	1608 (100.0)	1551 (100.0)	-3.55 (100.0)	1462 (100.0)	1368 (100.0)	-6.43 (100.0)	1042 (100.0)	1103 (100.0)	5.85 (100.0)	4112 (100.0)	4082 (100.0)	-0.73 (100.0)
Poultry	29	47	62.07	24	26	8.33	68	129	89.71	121	202	66.94

Note: Figures in brackets indicate the percentage to row total.

In fact, the productivity of sheep in terms of production of wool has been increased fairly at a larger level during the recent past while it has remained stagnant for goat. The reason behind the declining trend as revealed in the population of goat over the years, therefore, could be the result of increasing initiatives of goats and sheep rearers to opt for rearing sheep rather than goats, as rearing of former animals provide higher economic benefits as compared to latter animal. Since the Bhotia community has been traditionally engaged in rearing of sheep and goat, along with spinning and weaving of woollen products largely in high hill and bordering to Nepal and Tibet of the State for several centuries, it is, therefore, our study revealed that the population of both sheep and goat is highly concentrated in high hill areas, in fact, none of the farm households in middle and low hill areas are engaged in rearing of sheep.

Keeping of cattle for obtaining milk, manure and its spiritual value seems to be well maintained by the farm households in almost all the locations of the State. Since despite considerable declining trend observed in the growth of population of the cattle during the recent past the share of cattle population among different livestock population is still dominating in each of the geographical locations. In fact, the population of milch buffaloes, which has been consistently increasing, has been noticed much below the population of cattle in all areas. The animals such as mules, donkeys and horses which are only used for transportation both goods and passengers, are concentrated only in more inaccessible areas of middle and high hill areas, while the rearing of remaining animals is carried out, more or less, at similar pattern in almost the geographical areas. In all, per household average numbers of animal comes around four in each middle and low hill areas and five in high hill areas.

The tendency of keeping animals for different purposes of farm households is seen largely determined by their size of land holdings. Average numbers of animal per household are estimated to be over seven for upper farm households as against only four for bottom farm households. To a certain extent the easy access to forest resources for using them as fodder for animals in high hills is seen providing an additional opportunity to the farm households, irrespective of farm sizes available with them, those are located in high hill areas as compared to farmers of middle and low hill areas. The overall growth of livestock population declined marginally at 0.73 per cent, mainly a declining trend of 3.19 per cent of livestock population in bottom farm households between 1997 to 2002.

Table 3.3: **Structure of Animal Husbandry According to the Size of Land Holdings**
(Holdings in Hect.)

Livestock Category	Below 1.0			1.0 – 2.0			2.0 and Above			All Groups		
	1997	2002	% Growth	1997	2002	% Growth	1997	2002	% Growth	1997	2002	% Growth
Cattle	990 (28.28)	790 (23.23)	-25.32	150 (28.41)	109 (20.53)	-27.33	4 (5.63)	6 (6.67)	50.00	1144 (27.82)	905 (22.17)	-20.89
Buffaloes	484 (13.78)	601 (17.67)	24.17	57 (10.80)	102 (19.21)	78.95	31 (43.66)	34 (37.78)	9.68	572 (13.91)	737 (18.06)	28.85
Sheep	29 (0.83)	37 (1.09)	27.59	12 (2.27)	18 (3.39)	50.00	—	—	—	41 (1.00)	55 (1.35)	34.15
Goat	715 (20.35)	581 (17.08)	-18.74	114 (21.59)	99 (18.64)	-13.16	10 (14.09)	16 (17.78)	60.00	839 (20.40)	696 (17.05)	-17.04
Bullocks	27 (0.77)	44 (1.29)	62.96	5 (0.95)	9 (1.70)	80.00	—	—	—	650 (15.81)	650 (15.92)	±0
Horses, Mules & Donkeys	560 (15.94)	562 (16.53)	0.36	86 (16.29)	86 (16.20)	±0	4 (5.63)	2 (2.22)	-50.00	32 (0.78)	53 (1.30)	65.63
Young Buffaloes	280 (7.97)	336 (9.88)	20.00	52 (9.85)	45 (8.48)	-13.46	20 (28.17)	26 (28.89)	30.00	352 (8.56)	407 (9.97)	15.63
Young Cattle	428 (12.18)	450 (13.23)	5.14	52 (9.85)	63 (11.86)	21.15	2 (2.82)	6 (6.67)	200.00	482 (11.72)	579 (14.18)	20.12
Total Animals	3513 (100.0)	3401 (100.0)	-3.19	528 (100.0)	531 (100.0)	0.57	71 (100.0)	90 (100.0)	26.77	4112 (100.0)	4082 (100.0)	-0.73
Poultry	96	181	88.54	25	18	-28.00	—	3	100.0	121	202	66.94

Note: Figures in brackets indicate the percentage to row total.

A substantial level of decrease in the population of cattle and goats has been visualised in the bottom and medium farm households while the population of bullock has been declining in upper farm households. The decrease in population of bullock in latter category households is attributed largely due to the fact that they are usually hiring out to both labourers and bullocks for ploughing land. The population share of sheep, goat and mule, horses and donkeys together, which are largely maintained by the farmers for supplementing their livelihood purposes has been reflected significantly much higher in bottom farm households as compared to upper farm households while the per household number of buffaloes are noted relatively larger in latter group of households than in the former one (Table 3.3). But the income generation potentials of all animals together which are maintained by bottom farm households could be postulated comparably at much lower level than the income generated from animals which are maintained by the upper farm households. These facts are the reflection of per household income being generated from different sources and the contribution of different

sources in the total income of different groups of farm households, as undertaken in detail in the last chapter. But, it has to be pointed out that maintenance of animals possessing larger income generation potentials could be performed largely by households either possessing larger land areas which a part could be used for fodder production or the household possessing edge in access to forest resources.

STRUCTURE OF PRODUCTION OF ANIMAL PRODUCE

Details of the production value per household of different animal produced and gross income derived from the services and sale of animals is presented in Table 3.4. The production value of animal produced as milk, ghee and wool is based on prevailing market prices of each product. However, the indicated production of mules, horses and donkeys is the value of gross income originated through using their services as the means of transportation. The changing production structure of different animal produces for two periods of time has also been accordingly analyzed.

Table 3.4: Structure and Growth of Per Household Production Value of Animal Produced by Geographical Locations

Products	High Hills			Middle Hills			Low Hills			All Areas		
	1997	2002	% Growth	1997	2002	% Growth	1997	2002	% Growth	1997	2002	% Growth
Milk	4002 (66.74)	7133 (67.42)	78.24	3605 (72.38)	6483 (78.87)	79.81	4504 (95.18)	7857 (96.16)	74.44	4042 (77.07)	7167 (79.53)	77.31
Ghee	29 (0.48)	48 (0.45)	65.52	106 (2.13)	140 (1.70)	32.08	13 (0.27)	15 (0.18)	15.38	49 (0.93)	67 (0.74)	36.73
Wool	8 (0.13)	6 (0.06)	-25.00	—	—	—	—	—	—	3 (0.06)	2 (0.02)	-33.33
Mule, Horse and Donkey	1172 (19.45)	2385 (22.54)	103.50	439 (8.81)	688 (8.37)	56.72	—	—	—	542 (10.34)	1037 (11.51)	91.33
Sale of Animals & Birds	785 (13.09)	1008 (9.52)	28.41	831 (16.68)	910 (11.07)	9.51	214 (4.52)	299 (3.66)	39.72	608 (11.59)	738 (8.19)	21.38
Total	5996 (100.0)	10580 (100.0)	82.35	4981 (100.0)	8220 (100.0)	65.03	4732 (100.0)	8171 (100.0)	72.68	5244 (100.0)	9011 (100.0)	71.83
Gross Value of Production (Rs.'000)	2375	3523		2036	258		1547	2672		5108	8776	

Note: Figures in brackets indicate the percentage to row total.

Among the various animal produces the share of milk production has been reported significantly a larger level of 79.53 per cent which in fact is still increasing to a certain level in each of the geographical location of the State. At the State level the milk production has

Increased from 419 thousand tonnes in 1979-80 to 715 thousand tonnes in 1999-2000, a rise of 71 per cent. Although the milk production from cows increased only 19 per cent, buffaloes milk production increased by 111 per cent. Buffaloes contribute more than 60 per cent of the total milk production. However, the milk yield increase per cow (73 per cent) has been far higher than that per buffalo (45 per cent) (Singh, 2003). All these developments that have been in milk production during recent past have been cited as the outcome of the implementation of World Bank funded Dairy Development Programme. The contribution of milk production generated in different farm households is largely related with their size of land holdings. As the share of milk production reaches as higher at 96 per cent for upper farm households to 79 per cent for medium and 67 per cent for bottom farm households. The amount of earnings generated from the services of mules, donkeys and horses forms second most contribution after the milk in the aggregate production value of farm households (12 per cent), though the corresponding share is significantly much larger in favour of farm households (22.54 per cent) of high hills followed by 8.37 per cent for households in middle hills while none of the households in low hills are acquiring any production from the concerned sources. A significant level of contribution of income originated from the sale of animals and birds has been visualised in each of the geographical locations but its share has been declined from 12 per cent to 8 per cent between 1997 to 2002.

The potentials of animal husbandry in view of achieving increasing level of income for maintaining the livelihood of farm households are by and large, quite significant in almost the geographical locations irrespective of the marginal differences prevailing in the share of production obtained from different categories of livestock. The aggregate value of production achieved from animal husbandry has been consistently increasing to a much appreciable extent in each of the geographical locations. Between the years 1997 and 2002, the increase in the total value of animal produce has been as higher at 71.83 per cent, ranging from lowest at 65.03 per cent in middle hills to highest at 82.35 per cent in high hills followed by 72.68 per cent in low hills. The significance of using mules, donkeys and horses as mode of transportation in middle and high hill areas has been gaining extremely larger popularity which has been reflected by the increase of a fairly larger value of earnings (91.33 per cent) in hiring out the services of particular animals during the reference period. The increase in the production value of milk during the same duration has also been quite significant at above 77 per cent, consisting 79.81 per cent in middle hills closely followed by 78.24 per cent in high hills and 74.44 per cent in low hills (Table 3.4). However, only the production of wool has shown a declining trend largely due to a considerable declining rate revealed in the population of goats.

Again the analysis presented in Table 3.5 indicates that the share of the value of milk production in the aggregate value of animal produced is significantly highest for each of the farm groups of households, 95 per cent for medium, 88 per cent for upper and 75 per cent for bottom farm households. However, the income originated from the services of mules, donkeys and horses has the second most share in the gross value of livestock production for medium and bottom farm households while the earnings from the sale of animals and birds is the only other head of livestock production along with the production of milk in the upper farm households and its share accounted only 1.45 per cent, which in fact is declining considerably during the recent past. Between the period 1997 to 2002, the value of milk production of each households has increased to a certain level though it revealed fairly much larger at 95.38 per cent for medium farm households as compared to upper (87.80 per cent) and bottom (74.56 per cent) farm households. However, irrespective of marginal decline trend prevailed in the share of earnings generated from the services of mules, horses and donkeys of medium farm households their aggregate earnings from concerned sources has increased at around 66 per cent and the corresponding increase for bottom farm households is reported as higher at 98 per cent during last five years of duration. But the income generated from the sale of animals and birds has declined considerably for each of the farm households during the same periods while the production of wool declined by 33.33 per cent for bottom farm households as against the increase of similar (33.33 per cent) percentage points for medium farm households. And the production of ghee, which is the product of milk, has been simultaneously increasing with the increase of milk production for both bottom and medium farm households.

Table 3.5: Structure and Growth of Per Household Production Value of Animal Produced by Size of Holdings
(Area in Hectares and Value in Rs.)

Products	Below 1.0			1.0 to 2.0			2.0 and Above			All Groups		
	1997	2002	% Growth	1997	2002	% Growth	1997	2002	% Growth	1997	2002	% Growth
Milk	3801 (76.71)	6635 (78.80)	74.56	5348 (73.75)	10449 (79.08)	95.38	12554 (97.61)	23577 (98.55)	87.80	4042 (77.07)	7167 (79.53)	77.31
Ghee	49 (0.99)	66 (0.78)	34.69	56 (0.77)	86 (0.65)	53.57	—	—	—	49 (0.93)	67 (0.74)	36.73
Wool	3 (0.06)	2 (0.02)	-33.33	6 (0.08)	8 (0.66)	33.33	—	—	—	3 (0.06)	2 (0.02)	-33.33
Mule, Horse and Donkey	477 (9.63)	944 (11.21)	97.90	1374 (18.95)	2271 (17.19)	65.28	—	—	—	542 (10.34)	1037 (11.51)	91.33
Sale of Animals & Birds	625 (12.61)	773 (9.18)	23.68	468 (6.45)	400 (3.03)	-14.53	308 (2.39)	346 (1.45)	12.34	608 (11.59)	738 (8.19)	21.38
Total	4955 (100.0)	8420 (100.0)	69.93	7252 (100.0)	13214 (100.0)	82.21	12862 (100.0)	23923 (100.0)	86.00	5244 (100.0)	9011 (100.0)	71.83
Gross Value of Production (Rs.'000)	4375	7435		566	1031		167	311		5108	8776	

Note: Figures in brackets indicate the percentage to row total.

Further Table 3.6 shows the pattern of sale of different livestock produced in different geographical locations. Selling of the animal produced do not require any wide ranging marketing network because the quantum of concerned produce is very limited only for meeting the requirements of local farming households. Any surplus quantity from the local demands can be easily sold out in nearby villages. The quantum of livestock produced sold by the farmers is the surplus quantity of produce, which remains after their consumption.

Table 3.6: Per Household Sale of Animal Produced by Geographical Locations

Products	High Hills			Middle Hills			Low Hills			All Areas		
	1997	2002	% Growth	1997	2002	% Growth	1997	2002	% Growth	1997	2002	% Growth
Milk	1451 (43.23)	2899 (46.06)	99.79	1299 (51.86)	2673 (60.83)	105.77	1572 (89.57)	3249 (91.55)	106.68	1443 (56.70)	2910 (61.61)	101.66
Ghee	4 (0.12)	11 (0.17)	175	24 (0.96)	36 (0.82)	50.00	—	—	—	9 (0.35)	15 (0.32)	66.67
Wool	8 (0.24)	6 (0.10)	25.00	—	—	—	—	—	—	3 (0.12)	2 (0.04)	33.33
Mule, Horse and Donkey	1142 (34.03)	2394 (38.04)	109.63	439 (17.52)	768 (17.48)	74.94	—	—	—	532 (20.90)	1066 (22.57)	100.38
Sale of Animals & Birds	751 (22.38)	984 (15.63)	31.03	743 (29.66)	917 (20.87)	23.42	183 (10.43)	300 (8.45)	63.94	558 (21.93)	730 (15.46)	30.82
Total	3356 (100.0)	6294 (100.0)	87.54	2505 (100.0)	4394 (100.0)	75.41	1755 (100.0)	3549 (100.0)	102.22	2545 (100.0)	4723 (100.0)	85.58
Gross Sale (Rs.'000)	1118	2096		787	1380		574	1125		2479	4601	

Note: Figures in brackets indicate the percentage to row total.

The share of milk in the gross sale value of livestock products constituted around 62 per cent followed by share of income earned through the services of mules, donkeys and horses (23 per cent) and the income through selling of the animals and birds (15 per cent). In different geographical locations the percentage contribution of milk in the total sale value of livestock products is reflected dominating in each of the geographical locations while the income earned through using the services of mules, horses and donkey is accounted possessing second most contribution in the total sale of livestock. Per household average value of livestock sale has been recorded for households is located in high hill areas Rs.6294 followed by households for middle Rs.4394 and lower hills Rs.3549 and it has been on the increase in each geographical locations. This trend indicate the fact that the potentials of bringing improvement in animal husbandry are well prevailing in different locations and at the pattern the surplus production after consumption of livestock has been increasing the similar pattern may continue in the near future in the

emerging situation of widening the availability of fodder as the consequences of persisting increasing pasture land, fallow land and decreasing actual forest cover area. It may also be added that the presently increasing trend of the surplus generated from livestock is sustained to a certain level the further development of animal husbandry sector can prove as an important option for supplementing at least some amount of income in the farm households and thus to achieve improvements in the livelihood conditions of the farmers in the State.

Similarly, across the different farm groups of households the value of per household sale of livestock produced ranges between Rs.17269 to Rs.4317 among the upper and bottom farm groups of households respectively and the corresponding value of sale has been remarkably increasing for each groups of farm households with an extremely much differential rates of over hundred per cent for both medium and upper farm households as against around 79 per cent for bottom farm households. Again the per household value of surplus milk after meeting the household consumption requirement assumes to be quite significant for all farm households. Since on an average per household average value of milk sale consisted at Rs.2910, which in fact is as higher at Rs.16923 for upper farm households as against Rs.4721 for middle and Rs.2544 for bottom farm households. Similarly, per household sale of milk is on the constant increase for each categories of farm households which reached over 98 per cent for upper farm households as against 65 per cent for medium and 59 per cent for bottom farm households between 1997 to 2002. A significant increase has also been reported in the aggregate sale of Ghee, income originated from the services of mules, horses and donkeys and the sale of animals and birds for each farm household.

Table 3.7: Per Household Sale of Animal Produced by Size of Holdings

(Holdings in Hect.; Value in Rs.)

Products	Below 1.0			1.0 to 2.0			2.0 and Above			All Groups		
	1997	2002	% Growth	1997	2002	% Growth	1997	2002	% Growth	1997	2002	% Growth
Milk	1356 (56.15)	2544 (58.93)	87.61	1382 (44.48)	4721 (65.34)	241.61	7692 (96.15)	16923 (98.00)	120.01	1443 (56.70)	2910 (61.61)	101.66
Ghee	10 (0.41)	15 (0.35)	50.00	6 (0.19)	17 (0.24)	183.33	—	—	—	9 (0.35)	15 (0.32)	66.67
Wool	3 (0.13)	1 (0.02)	-66.66	6 (0.19)	8 (0.11)	33.33	—	—	—	3 (0.12)	2 (0.04)	-33.33
Mule, Horse and Donkey	477 (19.75)	992 (22.98)	1.8	1246 (40.10)	2079 (28.78)	66.85	—	—	—	532 (20.90)	1066 (22.57)	100.38
Sale of Animals & Birds	569 (23.56)	765 (17.72)	34.45	467 (15.03)	400 (5.54)	-14.35	308 (3.85)	346 (2.00)	12.34	558 (21.93)	730 (15.46)	30.82
Total	2415 (100.0)	4317 (100.0)	78.76	3107 (100.0)	7225 (100.0)	132.54	8000 (100.0)	17269 (100.0)	115.86	2545 (100.0)	4723 (100.0)	85.58
Gross Sale (Rs.'000)	2132	3813		242	564		104	225		2479	4601	

Note: Figures in brackets indicate the percentage to row total.

PATTERN OF SALE AND CONSUMPTION:

Traditionally, significant importance is attached to animal husbandry in the State for both social and economic considerations. Traditionally every household keeps either a cow or a buffalo, irrespective of its economic viability. The farming households keep a pair of or at least one bullock for drought purposes. However, the number of and composition of animals may vary from village to village and one household to another, according to the availability of grazing lands and the size of land holdings. In any case animals are the main sources of supply of fertilizers and milk, as well as for drought purposes. The milk and other milk products are generally consumed by the concerned households and if any surplus, are sold out within the villages to other farm households. On an average the per household consumption value of livestock products accounted for Rs.4288, comprising relatively at highest level in low hills (Rs.4730) followed by high hills (Rs.4286) and middle hills (Rs.4286). The pattern of consumption of various livestock products of farm households in each of the geographical locations seems to be consistently increasing to the tune of its increasing quantum of productions. In fact the per household sale value of livestock products is also considerably increasing during the recent past. With the larger increasing trend revealed in the per household sale value of livestock products as compared to per household value of consumption the share of consumption value has declined from 51.47 per cent to 47.59 per cent as against the increasing share in sale value of 48.53 per cent to 52.41 per cent during 1997 and 2002. Similar situation in terms of increasing share of sale and decreasing pattern of consumption per household has been well recognized in each of the geographical locations (Table 3.8).

Table 3.8: Structure of Livestock Production, Sale and Consumption
Among Different Geographical Locations

Areas	Per Household Value in Rs.								
	Production			Sale			Consumption		
	1997	2002	% Growth	1997	2002	% Growth	1997	2002	% Growth
High Hill	5996 (100.00)	10580 (100.00)	76.46	3356 (55.97)	6294 (598.49)	87.54	2640 (44.03)	4286 (40.51)	62.35
Middle Hill	4981 (100.00)	8220 (100.00)	65.02	2507 (50.33)	4394 (53.45)	75.27	2474 (49.67)	3826 (46.55)	54.65
Low Hill	4732 (100.00)	8171 (100.00)	72.67	1755 (37.09)	3441 (42.11)	96.08	2977 (62.91)	4730 (57.89)	58.08
Total	5244 (100.00)	9011 (100.00)	71.82	2545 (48.53)	4723 (52.41)	85.58	2699 (51.47)	4288 (47.59)	58.07

Note: Figures in brackets indicate the percentage to row total.

Similarly per household average value of livestock production, sale and consumption of different categories of farm households seems to be significantly increasing over the years.

However, in the total value of livestock production the percentage share of sale value has been declining while that of consumption value has been increasing in spite of a considerable increase in per household sale and consumption value of different categories of farm households during the recent past. Thus, keeping into consideration the overall analysis it may be well postulated the fact that due to a significant level of success that has achieved in increasing the volume of different livestock products has subsequently changed the overall consumption and sale pattern of farm households in every geographical location. Between the period 1997 to 2002, the volume of livestock produced has increased as higher at 72 per cent and as a result, it has subsequently pushed up the consumption level at around 59 per cent but a major outcome has seen in terms of an increase of over 86 per cent sale of different livestock produce of the farm households during the same periods. The average consumption of livestock production in the upper farm households was already at optimum level during 1997 and so the increase in per household average consumption for upper farm households has been reported relatively much less as compared to medium and bottom farm households irrespective of the fact that the increase in the volume of production as well as sale value is revealed fairly much larger for former groups of households as compared to latter one. In all the per household sale of livestock production has increased at 86 per cent, comprising 132 per cent for medium farm households, 116 per cent for upper farm households and 79 per cent for bottom farm households during 1997 to 2002 (Table 3.9).

Table 3.9: Structure of Livestock Production, Sale and Consumption by Size of Land Holdings

Land Holding Size (in Hect.)	Per Household Value in Rs.								
	Production			Sale			Consumption		
	1997	2002	% Growth	1997	2002	% Growth	1997	2002	% Growth
0.0 – 1.0	4955 (100.00)	8420 (100.00)	69.23	2415 (48.74)	4318 (51.28)	79.00	2540 (51.26)	4102 (48.72)	61.00
1.0 - 2.0	7252 (100.00)	13214 (100.00)	82.21	3108 (42.86)	7225 (54.68)	132.00	4144 (57.14)	5989 (44.32)	45.00
2.0 and Above	12862 (100.00)	23923 (100.00)	86.00	8000 (62.20)	17269 (72.19)	116.00	4862 (37.80)	6654 (27.81)	37.00
Total	5244 (100.00)	9011 (100.00)	72.00	2545 (48.53)	4723 (52.41)	86.00	2699 (51.47)	4288 (47.59)	59.00

Note: Figures in brackets indicate the percentage to row total.

MAINTENANCE COST OF LIVESTOCK

As indicated earlier that availability of a larger area under forest, easy access to fodder and increasing pasture land area have been providing a greater opportunity to the farming community in almost the locations of the State to engage in animal husbandry and making it as an important source of their livelihood. Due to largely involvement of family labourforce in looking after their animals and the easy access to the availability of fodder in the forests without making any payments on its collection the per animal maintenance cost, presented in Table 3.10, comes around only Rs.545. The paid out per animal labour and fodder cost is estimated only Rs.50 and Rs.257 respectively. Other heads of cost include as expenditure undertaken on the purchase of foodgrains and medicines and the transportation charges paid for procurement of various materials, which used for feeding the animals. In spite of the fact that a major part of required fodder for feeding animals is obtained from the forests without making any payments, its share in the total maintenance cost of livestock is still as higher at 47.16 per cent, while the share of foodgrain comes next at 35.23 per cent. Similarly, average maintenance cost per animal is registered comparatively much larger in high hill areas (Rs.706) than the case of low (Rs.495) and middle (Rs.402) hill areas because the farm household in high hill areas are making relatively much higher expenditure on feeding foodgrains to the animals as compared to the households of remaining areas.

Table 3.10: Head-wise Maintenance Cost of Animals by Geographical Locations
(Value of cost in Rs.)

Heads of Maintenance Cost	High Hills	Middle Hills	Low Hills	All Areas
Labour	61 (8.64)	36 (8.96)	51 (10.30)	50 (9.17)
Fodder	293 (41.50)	207 (51.49)	266 (53.74)	257 (47.16)
Foodgrains	291 (41.22)	120 (29.85)	144 (29.09)	192 (35.23)
Medicines	29 (4.11)	20 (4.98)	25 (5.05)	24 (4.41)
Transport	31 (4.39)	19 (4.72)	9 (1.82)	21 (3.85)
Others	1 (0.14)	—	—	1 (0.18)
All Heads	706 (100.0)	402 (100.0)	495 (100.0)	545 (100.0)

Note: Figures in brackets indicate the percentage to row total.

Assessment has also been carried out to look into the extent of differences are prevailing in the pattern of maintenance cost of animals of different categories of farm households in Table 3.11. Since the upper farm households were noted largely engaged in animal husbandry and as the consequences they were deriving significantly much higher amounts of income from

livestock as compared to bottom and medium farm households. We again find that the former groups of farm households are bearing relatively much larger cost in maintaining animals as compared to other two farm groups of households. Average amount of maintaining of mules, horses and donkeys in almost the geographical locations is a very costly affair. At the same time it has to be noted that per household income being generated from the services of these animals has been

Table 3.11: **Head-wise Maintenance Cost of Animals by size of Holdings**
(Holdings in Hect. and Value of cost in Rs.)

Heads of Maintenance Cost	Below 1.0	1.0 – 2.0	2.0 and Above	All Areas
Labour	48 (8.79)	28 (5.33)	250 (42.37)	50 (9.17)
Fodder	267 (48.90)	227 (43.24)	63 (10.68)	257 (47.16)
Foodgrains	185 (33.88)	229 (43.62)	231 (39.15)	192 (35.23)
Medicines	24 (4.40)	22 (4.12)	46 (7.80)	24 (4.41)
Transport	22 (4.03)	19 (3.62)	—	21 (3.85)
Others	1 (0.14)	—	—	1 (0.18)
All Heads	546 (100.0)	525 (100.0)	590 (100.0)	545 (100.0)

Note: Figures in brackets indicate the percentage to row total.

observed significantly much higher than from the produce of remaining animals. The second most expensive animals are the buffaloes. Maintenance cost of buffaloes is estimated at Rs.898, comprising at highest level per animal maintenance charges for upper farm households are estimated to be Rs.590 as against Rs.546 for bottom and Rs.525 for medium farm households. The proportionate expenditure to be carried for the purchase of fodder has been reported to be at highest level among the various heads of maintenance cost of livestock. And the upper farm households are spending relatively much lower amounts on purchasing fodder as compared to medium and bottom farm groups of households due to the fact that former categories of farm households have the additional advantages of obtaining larger quantum of fodder from their farm as they own larger sizes of farm lands as compared to latter categories of farm households. Per animal expenditure on the purchase of fodder for upper farm households is estimated to the tune of Rs.63 only as against Rs.267 for bottom and Rs.227 for medium farm households (Table 3.11). In fact, the upper farm households are seen feeding relatively higher quantum of foodgrains to their animals as compared to bottom and medium farm households due to the obvious reasons that the former groups of households have not to make negligible or in fact no expenditure on purchasing foodgrains, instead their farm produced foodgrains is sufficient to meet their own and animals' food requirement.

Table 3.12: **Per Unit Maintenance Cost of Rearing Animals by Location**

Animals	High Hills	Middle Hills	Low Hills	All Areas
Cow	393	288	409	361
Buffalo	1188	682	845	898
Bullock	456	256	400	350
Sheep	168	—	—	189
Goat	62	15	38	49
Mule, Horse and Donkey	11381	4533	—	9055
Birds	7	96	23	29
Average	707	402	495	545

Attempts has also been in Table 3.12 to assess the cost involved in maintaining different livestock and birds in various geographical locations of the State. It is evident that low maintenance cost of large farm due to sufficient fodder generated from their farm in high hills (Rs.1188) followed by Rs.845 in low and Rs.682 in middle hill areas. Accordingly, the corresponding cost of maintenance of buffaloes for bottom farm households is reported to be highest at Rs.903 followed by Rs.892 for medium and Rs.845 for upper farm households. In all, the bottom farm households are spending fairly larger amounts on the maintenance of each of the animals as compared to upper farm households. It is largely the fact that the larger farm households are obtaining a larger quantity of fodder and foodgrains for feeding animals from their own farms in addition from the forests while the bottom farm households are largely dependent on the fodder available in the forests and very limited supply of both fodder and foodgrains is met out from their small farm holdings.

Table 3.13: **Per Unit Maintenance Cost of Rearing Animals by Size of Holdings**
(Holdings in Hect. and Cost in Rs.)

Animals	Below 1.0	1.0 – 2.0	2.0 & above	All Groups
Cow	362	355	350	361
Buffalo	903	892	845	898
Bullock	375	200	—	350
Sheep	281	—	—	189
Goat	56	12	—	49
Mule, Horse and Donkey	9141	8639	—	9055
Birds	32	—	—	29
Average cost for All Animals	546	525	590	545

INCOME AND EMPLOYMENT PERSPECTIVES OF ANIMAL HUSBANDRY

Finally an exercise has been undertaken to assess the emerging contribution of animal husbandry in originating income and providing employment opportunities in different geographical spreads and across the farm continuum. The analysis presented in preceding chapter has well highlighted that the net output and returns from animal husbandry have been consistently increasing over the years but the pattern is varying to a certain level among different locations and according to the size of land holdings of the farmers. Similarly the extent of differences are well prevalent in the cost structure of maintaining different animals according to both geographical spreads as well as across the holding sizes of farm households.

Profitability of adopting animal husbandry in different geographical locations could also better understand through examining the extent of variation prevailing in the value of livestock out and the cost structure involved in maintaining the livestock. Based on our micro analysis in this regards, we find a very higher level of net returns are being derived from animal husbandry, largely due to the per animal cost of maintenance stands fairly very low as compared to net output is being derived. The output – input ratio stands around 3.81 points, comprising as higher at 4.60 points in middle hills to 4.38 points in low hills and 3.12 points in high hills.

A very little differences in per household income being originated from farm sector and animal husbandry is also highly prevalent in almost the geographical locations. The contribution of animal husbandry in the total income of farm households is accounted for nearly 14 per cent, in fact is reported significant much larger at 17.07 per cent in high hills as compared to middle (12.71 per cent) and low (11.10 per cent) hill areas. It may be noted that excepting in low hill areas where agricultural land is relatively more fertile and consequently the productivity remains almost much higher as compared to remaining two areas, the contribution of animal husbandry in the total income of farm household is significantly much higher as compared to income generated from farm sector in both high and middle hill areas (Table 2.16). In other workers, in the total income of farm households the share of income generated from animal husbandry stands almost five times higher in high hills and two-folds higher in middle hills as compared to income generated from farm sector.

Table 3.14: **Income and Employment Perspectives of Animal Husbandry by Locations**

(Value in Rs.)

Description	High Hills	Middle Hills	Low Hills	All Areas
Gross Output	3523300	2581140	2672038	8776478
Cost of Maintenance	1129600	560530	610408	2300538
Output – Input ratio	3.12	4.60	4.38	3.81
Gross income (All Sources)	9551793	13568972	14515532	37636297
Income from Animal Husbandry	2393700	2020610	2061630	6475940
Percentage Share to Total Income	25.06	14.89	14.20	17.21
Employment (Total)	959	861	873	2693
Employment (Animal Husbandry)	481	452	436	1369
Percentage Share in Total Employment	50.16	52.50	49.94	50.84
Per Worker Productivity	7324.95	5710.49	6128.53	6410.87
Per Worker Income	4977	4470	4729	4730

The potential of animal husbandry in providing employment opportunities to the labourforce of farming households also recognized at quite significant level in almost the geographical locations. The analysis presented in Table 3.14 interestingly points out that little over half of workforce available in different geographical locations is partly or fully engaged in animal husbandry. The corresponding share of employment in animal husbandry stands 52.50 per cent in middle hills, 50.16 per cent in high hills and 49.94 per cent in low hills. The per worker productivity in animal husbandry has also been recognized significantly much higher as compared to the productivity level of workers engaged in farm sector in almost the locations. The per worker productivity level of animal husbandry are estimated to be as higher at Rs.6411, comprising Rs.7325 in high hills followed by Rs.6128 in low hills and lowest at Rs.5710 in middle hills. After deducting various input costs of maintenance per worker net earnings comes around Rs.4730 and it consists relatively higher in high hills at Rs.4977 followed by Rs.4729 in low hills and Rs.4470 in middle hills. Thus, the overall analysis has well supported the fact that Initiating further development approaches in animal husbandry in the pattern that the dairy development programme has already been initiated could be an instrumental measure for strengthening the increasing contribution of animal husbandry in the income of farming households to a certain extent in almost the locations. Since, farm sector alone is expected would not be in a position to provide sufficient income for maintaining the livelihood of farming households in the future in the State.

Further, a relative contribution of animal husbandry in providing employment opportunities and the avenues of incomes has been assessed at different farm continuum levels. Referring the analysis undertaken in Table 2.17, it may be pointed out that the contribution of animal husbandry in the total income generated from different sources is highly appreciable. In fact both bottom and medium farm households are noted deriving significantly much higher income from maintaining livestock as compared to what they are earning from undertaking farming activities. The share of animal husbandry in the total income of farm households ranges highest from 20.23 per cent for upper farm households to lowest at 16.92 per cent for bottom and 18.61 per cent for medium farm households. The extent of net economic benefits to be derived from undertaking animal husbandry also seems to be at a quite higher level across different sizes of farms. Since the output – input ratio is turned out to be at the extent of ranging lowest from 3.57 points for middle farm households to highest at 5.66 points for upper and 3.80 points for bottom farm households.

Dealing with the level of employment elasticity of adopting animal husbandry as the source of employment of rural labourforce the analysis revealed that the animal husbandry has been gainfully engaging over half of the labourforce availability in different farm households, though the nature of getting employment in maintaining livestock is not on regular basis. As the rural labourforce is seen engaged in at least more than one economic activity and the animal husbandry has been noted as the secondary occupation in the cases of all workforce engaged on it. Even describing animal husbandry as the secondary occupation of workforce and also the secondary source of income of farm households in most of the cases, the per worker productivity of workforce engaged in animal husbandry has been reported significantly at higher level as compared to productivity of workers engaged in farm sector especially for bottom and medium farm households. Despite the fact that the per worker productivity of workers engaged in animal husbandry stands approximately two-folds higher for those belonging to upper farm households as compared to the workers of middle and bottom farm households. In all the per worker productivity in animal husbandry has been estimated ranging highest at Rs.14136 for upper farm households to lowest at Rs.6150 for bottom and Rs.7469 for medium farm households. And the annual earnings of workers from maintaining livestock has been estimated to the tune of ranging from Rs.11641 to Rs.4531 for workforce of upper and bottom farm households respectively.

Table 3.15 **Income and Employment Perspectives of Animal Husbandry by Size of Holdings**

SN	Description	(Value in Rs.)			
		Below 1.0	1.0 – 2.0	2.0 & above	All Areas
1.	Output	7434788	1030690	311000	8776478
2.	Cost of Maintenance	1957238	288400	54900	2300538
3.	Output-Input Ratio	3.80	3.57	5.66	3.81
4.	Gross Income (all sources)	32381749	3988713	1265835	37636297
5.	Income from Animal Husbandry	5477550	742290	256100	6475940
		16.92	18.61	20.23	17.21
6.	Employment (Total)	2383	269	41	2693
7.	Employment Animal Husbandry.	1209	138	22	1369
	% share in total Employment	50.73	51.30	53.66	54.84
8.	Per Worker Productivity	6149.54	7468.77	14136.36	6410.87
9.	Per Workers Income	4531	5379	11641	4730

Keeping into consideration the overall contribution of animal husbandry in supplementing income for different categories of farm households and its capacity as visualised in terms of engaging available labourforce of farm households in different geographical locations and providing substantial amount of per worker productivity and returns the animal husbandry is expected would play a rather crucial role in the economy of the State. The rather favourable factors supporting to promoting animal husbandry are the availability and easy access to fodder in the forests and increasing pasture and grazing land area in almost the areas of the State. The implications of these all comparative advantages favouring the promotion of animal husbandry can be well visualised in terms of increasing contribution of income being generated from livestock to the gross income of farm households over the years.

The Animal Husbandry Department with the assistance of UNICEF introduced a dairy development programme in the State in 1994-95 to boost up the milk production. The marketing network for milk was developed through the establishment of milk collection centres along the roadside and in the main milk producing areas. The concerned efforts have been a very successful programme in achieving both increasing the milk production as well as sustaining the incomes of farm households. Similarly, the Sheep Development project initiated by the same department in 1976 has also been quite successful in improving the breeds of sheeps and thus increasing the poor sheep wool production in the past. The income of sheep rearers in high altitude areas has increased significantly and the woolen based activities started developing in almost the areas of the State. In this manner, initiatives of various animal specific developmental programmes for promoting animal husbandry could be an important option for the creation of additional employment opportunities and sustaining the livelihood of marginal farm households in the State.

CHAPTER IV

EMERGING CHANGES IN CROPPING PATTERN, PRODUCTION AND PRODUCTIVITY

A study of cropping pattern reveals the proportion of land area under the production of different crops while the changing pattern of cropping is in response to changing economic, technological and institutional factors. Economic studies on cropping pattern normally emphasize two important characteristics of agricultural land viz., its heterogeneity and possibility of crop substitution (Swarup and Sikka, 1983). Heterogeneity arises from agro-climatic differences, which include rainfall, soil and temperature differing from region to region, within the State and the possibility of crop-substitution emerges largely as a result of increasing access to various improved farm technologies, including irrigation facilities and marketing (Venkataramanan, 1978). However, in regards to mountain and hilly areas the differences existing in physio-geographical, agro-climatic, soil characteristics, rainfall and water availability at regional level among the districts, even among different watersheds and geographical locations within a district have been largely contributing to the differential characteristics of cropping pattern. Similarly, in adequately developed improved agricultural technologies, undulating, topography, sloppy fields, problems of increasing soil-erosion risk and uncertainty due to weather, divorce of agriculture from science and technology to a large extent, lack of post harvest technology as storage, processing and marketing the possibility of substitution, especially in the context of shifting land and changing cropping pattern under different alternative profitable options have been largely lacking in the State in general and especially in middle and high hill areas.

The farmers have been adopting the practices of utilizing their limited cultivated lands mainly in growing various traditional crops. Despite the fact that over the years many innovations have been developed in the area in the form of improved farm practices, know-how technologies and of high yielding variety seeds, fertilizers, plant protection technologies and even the credit facilities. There appears to be a big time lag in the adoption of all these devices associated to bringing empowerment in crop productivity in most part of the State. To a certain extent, inadequately developed irrigation facilities resulting a high degree of increasing dependency on rail water for irrigating farm could also be the real factor behind showing inability of most farmers to adopt improved agricultural practices.

Despite of local conditions and environmental situations limiting the scope for adoption of improved farm practices to a desirable level the evidences are also available that the certain areas specific advantages and opportunities provided by the nature in almost the areas of the State the farmers have also been making the use of these advantages in shifting their available small parcels of lands into the production of high value crops, especially according to the available area specific advantages favouring to the production of particular food and non-food crops. Moreover, the allocation of land under various traditional low value crops and high value crops and even under the production of certain non-food crops has been taking place in accordance to the available soil structure, climatic conditions, markets and various other basic resource endowments available in different areas. However, the traditional concept of allocation of land under various options in terms of growing different food and non-food crops and in optimising the per unit productivity and profitability have been recognized as the most common feature of farming system and practices being adopted by the farmers. At the same time almost the farmers in different geographical locations have been well awared in allocating their small farms into various best possible options in terms of deriving maximum per hectare economic returns. Though such options are recognized largely varying among different locations and also in the cases of farmers owning different sizes of holdings. Obviously the farmers possessing relatively larger size of holdings have the additional advantages over the farmers owning small holdings in allocating their land under different options of cropping systems and optimising the per hectare productivity.

Keeping these highlighted facts and several other assumptions into consideration the present chapter, therefore, deals to examine the existing cropping pattern, seasonal distribution of cropped land, contribution of each crop in total foodgrain production and the extent of changes occurring in overall farming system, production and productivity structure in the context of different food and non-food crops at State level, across different geographical locations and according to the levels of farm sizes. The State level analysis is based on secondary data obtained from different Government Departments while the area specific and for different farm groups level analysis is based on primary data collected among a sample of households selected from different clusters of villages located in various watersheds of both Garhwal and Kumaun divisions of Uttaranchal.

DATA AND ITS ANALYSIS

The collection of secondary data and the fixation of duration for which the various agricultural data to be incorporated in the present study point of view have been a very uphill task. Traditionally, the agricultural statistics were not collected for every year when the Uttaranchal was a part of Uttar Pradesh and only estimates made occasionally were recorded (Swarup, 1991). Even today, the agriculture department of Uttaranchal Government has neither been seriously collecting nor estimating the agricultural statistics. Instead the concerned data as estimated by the agricultural department of Uttar Pradesh is being adopted for various purposes by the Uttaranchal Government. So far the latest estimated data available in relation to Uttaranchal constituted for the year 1999-2000. Frequently re-organization of the structure of the already created districts and the emergence of new districts over the years have also created another serious problem to analysis and compare the various available agricultural statistics for different periods at the district level. Inclusion of Haridwar district into Uttaranchal and non-availability of required data for the concerned district, especially prior to its creation in the year 1986, have also created some additional problem in deciding for the duration of time-series data to be collected for incorporating in the present study. Considering these problems in mind, finally we decided to collect the time series secondary data in relation to cropping pattern, and crop-wise production and productivity structure for the period beginning from 1986-87. Moreover, various crop statistics, e.g., area, production and productivity of each food and non-food crop have been collected from the office of Agricultural Department of Uttar Pradesh. While the details in terms of area, and production pattern related to fruits and vegetables have been collected from the department of Economics and Statistics as the agricultural bulletins published by the Agricultural Department have not been providing any data on the production of fruits and vegetables.

EXISTING CROPPING PATTERN

(i) **At State Level:** Considering into account that there prevail larger differences in the cropping pattern, production and productivity structure of agricultural crops during one to another cropping seasons due to changing characteristics of monsoon and certain related factors we decided to derive the average of three years data in relation to crop-wise area, and production starting from the period 1986-87. Thus, the various agricultural statistics has been presented for three points of duration and include the averages for the years 1987 to 1990, 1992 to 1995 and 1997 to 2000.

The cropping pattern of the State has been presented in Table 4.1 at three points of time. It seems that like in most part of the country, growing of cereals and millets forming a

bulk of the food-crops altogether has taken a significantly larger share in total cropped area. Of the total cropped area of 1373 thousand hectares in the State the area under foodgrains was around 70 per cent during 1997-2000 whereas it was significantly as high as over 74 per cent during the previous duration of 1987-90 and 72 per cent during 1992-95. Thus, the concerned analysis depicts the fact that the farmers in the State are still appreciably concentrated in putting a major land area under the production of food crops, though, over the years, this trends has been narrowing down to a certain extent. As an increasing share of land areas under the production fruits and vegetables has adversely affected the land area being put under the production of foodgrains. The share of cropped area under fruits has increased from 12.13 per cent in 1987-90 to 13.16 per cent in 1992-95 and 13.59 per cent in 1999-2000. Similarly the share of area under the production of vegetable has gone up from 3.69 per cent to 5.14 per cent between the period 1986-90 to 1997-2000. It may be mentioned here that the non-food crops such as sugarcane, tobacco, etc. are grown only in plain areas and the area under these crops have also shown a constant increase during the recent past, especially during 1992-95 and 1999-2000. The oilseeds and pulses, which are considered to be high value crops as compared to cereals, the share of area under both the crops, have also been consistently increasing in the state. The share of area under pulses has increased from 2.38 per cent in 1987-90 to 2.41 per cent in 1999-2000 while it has increased from 2.25 per cent to 3.02 per cent for oilseeds during the same periods.

Table 4.1: **Cropping Pattern At The State Level**

(Area in Hects)

CROPS	1987-90		1992-95		1997-2000		COMPOUND GROWTH RATE	
							1987-90 to 1992-95	1992-95 to 1997-2000
	AREA	PERCENTAGE	AREA	PERCENTAGE	AREA	PERCENTAGE	AREA	AREA
FOODGRAINS	1045418	74.27	998018	71.53	959544	69.87	-0.92	-0.78
OILSEEDS	31637	2.25	39018	2.80	41525	3.02	4.28	1.25
VEGETABLES	52009	3.69	67959	4.87	70622	5.14	5.50	0.77
FRUITS	170744	12.13	183541	13.16	186608	13.59	1.46	0.33
NON-FOOD CROPS	107748	7.65	106641	7.64	114989	8.37	-0.21	1.52
GROSS CROPPED AREA	1407556	100.00	1395177	100.00	1373288	100.00	-0.18	-0.32

Source: 1) Agricultural Statistics of U.P for respective years, Krishi Bhavan, Lucknow

2) Statistical Abstracts for respective years, Economics and Statistics Department, Lucknow

Further, the analysis reveals that wheat and rice are the most important food crops, among the various food-crops grown in the State. The share of land area under the production of wheat to total area put under the production of foodgrains accounted for little over 39 per cent during 1999-2000, though it has marginally declined as compared to the share of about 41 per cent each in 1987-90 and 1992-95. The corresponding share of rice has been 30 per cent during 1997-2000 while it has been consistently increasing over the years. Madua is another most important food crop grown during kharif crop season along with the rice. Its share in total area of food crops has been estimated at around 14 per cent which is almost the same as recorded during 1987-90 but relatively higher than it was during 1992-95..

Table 4.1(a): Area Under Major Foodgrains At The State Level

(Area in Hects)

CROPS	1987-90		1992-95		1997-2000		COMPOUND GROWTH RATE	
	AREA	PERCENTAGE	AREA	PERCENTAGE	AREA	PERCENTAGE	1987-90 to 1992-95	1992-95 to 1997-2000
							AREA	AREA
RICE	291726	27.91	290646	29.12	288671	30.08	-0.07	-0.14
MADUA	145929	13.96	12416	12.44	131633	13.72	-3.18	1.18
SAWAN	79302	7.59	74374	7.45	70003	7.30	-1.27	-1.20
WHEAT	423886	40.55	412377	41.32	377376	39.33	-0.55	-1.76
BARLEY	32564	3.11	26837	2.69	24646	2.57	-3.79	-1.69
OTHER_CEREALS	38564	3.69	33702	3.38	34162	3.56	-2.66	0.27
ALL CEREALS	1011971	96.80	962097	96.40	926491	96.56	-1.01	-0.75
ALL PULSES	33447	3.20	35921	3.60	33.53	3.44	1.44	-1.65
ALL FOODGRAINS	1045418	100.00	998018	100.00	959544	100.00	-0.92	-0.78

Source: 1) Agricultural Statistics of U.P for respective years, Krishi Bhavan, Lucknow

2) Statistical Abstracts for respective years, Economics and Statistics Department, Lucknow

Moreover, the cropping pattern have received a tremendous changes over the years as the analysis presented through incorporating the compound growth of various crops witnessed the fact that the practices of using available land under the production of traditional crops and low value food crops have been consistently narrowing down while the trend of converting land under the production of high value and market oriented crops such as, fruits, oilseeds and vegetables has been getting an appreciable importance in the State. The area under the fruits and vegetables have been increasing at the rate of 0.33 per cent and 0.77 per cent respectively, though this trend of growth for both the crops remained relatively at lower level during the

period 1992-95 to 1997-2000 as compared to the previous period comprising 1987-90 to 1992-95. Area under non-food crops such as sugarcane, tobacco, etc. is also on its way of increasing trend, especially from the period 1992-95 while it was decreasing at the rate of 0.21 per cent prior to the period 1992-95.

(ii) **Across the Regions:** Extent of differences have been largely prevailing in the farming system, cropping pattern and the per hectare productivity structure of major crops among different geographical locations. Based on the primary data obtained from the selected farm households from different watersheds and geographical locations the analysis presented in Table 4.2 in relation to the share of area under different crops seems to be almost similar as revealed through analysing secondary data. As according to both the sources of data a major part of the lands are used for growing foodgrains but their share has been consistently declining while on the other hand the share of land area under high value crops such as fruits, vegetables and oilseeds has been significantly increasing during the recent past. In fact, the proportion of area under foodgrains constituted exactly to around 70 per cent for the period 1997 on the basis of incorporating both primary and secondary data. Almost the same level of similarity is emerging in the proportion of area and changing characteristics of cropping pattern concerning to fruits, vegetables and oilseeds in analysing both primary and secondary data. In a situation of such a high level of similarity has been occurring in the agricultural statistics on various aspects through analysing secondary data and the primary data collected from the identified sample of farm household it would be worthwhile to accept concerned primary farm size levels, and on others

Table: 4.2: **Emerging Cropping Pattern Based On Sample Data**

(Area in Hects)

CROPS	1997		2002		PERCENTAGE CHANGE
	AREA	PERCENTAGE	AREA	PERCENTAGE	1997 TO 2002
PADDY	172.41	22.66	170.68	22.75	-1.00
MADUA	24.92	3.28	35.84	4.78	43.82
SAWAN	16.35	2.15	15.76	2.10	-3.61
WHEAT	170.80	22.45	156.44	20.85	-8.41
BARLEY	18.28	2.40	14.13	1.88	-22.70
OTHER CEREALS	41.83	5.50	23.63	3.15	-43.51
ALL CEREALS	444.59	58.44	416.48	55.50	-6.32
PULSES	84.52	11.11	81.12	10.81	-4.02
ALL FOODGRAINS	529.11	69.55	497.60	66.31	-5.96
OILSEEDS	31.44	4.13	27.26	3.63	-13.30
SPICES	13.14	1.73	15.81	2.11	20.32
FRUITS	79.06	10.39	85.85	11.44	8.59
VEGETABLES	85.19	11.20	104.72	13.96	22.93
NON-FOOD CROPS	22.86	3.00	19.16	2.55	-16.19
GROSS CROPPED AREA	760.80	100.00	750.39	100.00	-1.37

data as the most representative to that of State level data especially in examining various farming situation as emerging across different geographical locations and across the various aspects related to which the data is not available readily from any other sources. Over the years, the declining trend in the share of area under foodgrains has been well reflecting in different geographical locations. But it has been declining comparably at a much higher rate in high and middle hill areas with a marginal decrease of 1 per cent points in low hill areas. On the other, the share of spices, fruits and vegetables has been considerably increasing in almost the locations.

Considering into account the changing characteristics of farming system across the different geographical locations over the years the analysis again highlights that the farming communities in different locations are reducing their available land area under the production of foodgrains at the rate of 1.22 per cent annually and such practices are noticed highly prevailing in high hill areas followed by middle hill areas and least in low hill areas. In fact the practice of using land under the production of oilseeds has also been significantly disappearing in each of the geographical locations. Instead, the farmers are found to have been highly reluctant in using their small size of lands under the options of producing high value and commercial crops such as off-season vegetables, spices and fruits. As during the period 1997 to 2002, the area allocated under the production of off-season vegetables has grown at the rate of 4.21 per cent, comprising 6.27 per cent in low hills, 5.47 per cent in middle hills and 2.34 per cent in high hills. And the incremental rate in the area under spices and fruits have been around 4 per cent and 2 per cent respectively during the corresponding period.

Thus it appears that the farmers have been increasingly focussing to divert their lands into the production of off-season vegetables followed by spices and fruits in each of the geographical locations. The obvious reasons for providing greater emphasis over the expansion of lands towards the production of vegetables and spices as compared to growing fruits are that the risk involved on the production of former crops from various natural calamities such as hill storms, forest animals, insects, etc. are fairly at lower order as compared to growing of fruits. In addition, the facts are also that the tradition of growing fruits has been initiated much before than in the case of vegetables in every area. As a result the land area allocated under the production of various fruits is already much higher than under the vegetables. Hence, due to above indicated factors coupled with already achieved high growth in area under fruits have resulted the much higher level of increasing trend in land area under vegetables than under fruits in different areas during the recent past.

Looking at the share of individual food crops in the total land put under the various foodgrains the analysis presented in Table 4.2(b) again reveals that fairly a larger proportion of cropped area has been diverted towards of production of cereals in each of the geographical locations, 96 per cent in high hills, 79 per cent in middle hills and 89 per cent in low hills. Another 16 per cent area has been used for the production of pulses and it stands highest at 21 per cent in middle hills followed by 20 per cent in high hills and at lowest proportion of 11 per cent in low hills. The analysis again shows that paddy and wheat are the dominant food crops in all the three locations, though a significant level of differences are seen prevailing in the proportion of area being put under these principle crops in different areas. As the cropped area under paddy has been estimated significantly much larger at 42 per cent in low hill areas as compared to 31 per cent in middle and 24 per cent in high hill areas. Similar pattern in the crop area under wheat has been recognized in case of different locations. The proportion of cropped area under millets such as madua, sawan, barley, etc. seems to be relatively higher in high and middle hills as compared to low hills. The recognized differences in the cropping pattern across different geographical locations are largely the result of a significant level of variations prevailing in the irrigation facilities, soil structure, climatic characteristics, etc. Masoor and urd seems to be the most important pulses grown in Rabi and Kharif crop season respectively in each of the geographical locations. However, the cropped area under urd stands relatively higher than under the masoor in middle and low hill areas while the reversal is the situation in high hill areas.

Table: 4.2 (a): **Cropping Pattern of Major Crops By Geographical Locations**

(Area in Hects)

CROPS	HIGH HILLS				MIDDLE HILLS				LOW HILLS				PERCENTAGE CHANGE		
	1997		2002		1997		2002		1997		2002		HIGH HILLS	MIDDLE HILLS	LOW HILLS
	AREA	PERCENTAGE	AREA	PERCENTAGE	AREA	PERCENTAGE	AREA	PERCENTAGE	AREA	PERCENTAGE	AREA	PERCENTAGE	1997- 2002	1997- 2002	1997- 2002
ALL FOODGRAINS	128.83	53.82	119.35	49.89	167.95	76.13	153.80	70.84	232.34	77.23	224.44	76.33	-7.36	-8.43	-3.4
OILSEEDS	5.58	2.33	4.56	1.91	9.84	4.46	9.22	4.25	16.02	5.32	13.48	4.58	-18.28	-6.30	-15.86
SPICES	0.90	0.38	1.00	0.42	11.76	5.33	14.21	6.54	0.48	0.16	0.60	0.20	11.11	20.83	25.00
FRUITS	63.86	26.68	69.15	28.91	3.26	1.48	3.64	1.68	11.94	3.97	13.06	4.44	8.28	11.66	9.38
VEGETABLES	40.19	16.79	45.12	18.86	27.78	12.59	36.26	16.70	17.22	5.72	23.34	7.94	12.27	30.53	35.54
NON-FOOD CROPS	0.00	0.00	0.04	0.02	0.00	0.00	0.00	0.00	22.86	7.60	19.12	6.50	0.00	0.00	-16.36
GROSS CROPPED AREA	239.35	100.00	239.23	100.00	220.60	100.00	217.12	100.00	300.86	100.00	294.04	100.00	-0.05	-1.58	-2.27

It has further been noted that excepting in the case of madua in middle hills the cropped area under different cereals has declined to a larger extent, ranging lowest from 1.00 per cent for paddy to the highest of around 23 per cent for barley between the period 1997 and 2002. Though the share of area under madua in the gross cropped area of foodgrains constituted only 7.20 per cent but for its growth has been very appreciable at 44 per cent. In fact the area under concerned crop has increased more than two-folds in middle hill area during the corresponding periods. Among the various pulses, the cropped area under gram, peas and rajma has increased in almost the areas. The area under both the dominant pulses, viz. masoor and urd has shown a declining trend excepting a minor increase of urd in low hill areas during the same period.

Table 4.2 (b): **Cropping Pattern Of Major Crops In Different Locations**

(Area in Hects)

CROPS	HIGH HILLS				MIDDLE HILLS				LOW HILLS				ANNUAL GROWTH DURING 1997-2002		
	1997		2002		1997		2002		1997		2002		HIGH HILLS	MIDDLE HILLS	LOW HILLS
	AREA	PERCENTAGE	AREA	PERCENTAGE	AREA	PERCENTAGE	AREA	PERCENTAGE	AREA	PERCENTAGE	AREA	PERCENTAGE			
PADDY	29.05	22.55	29.18	24.45	50.50	30.07	47.32	30.77	92.86	39.97	94.18	41.96	0.09	-1.25	0.28
MADUA	18.10	10.31	15.67	13.13	14.35	3.47	12.83	8.34	8.72	2.50	7.34	3.27	-2.69	-2.11	3.17
SAWAN	8.04	6.24	8.42	7.05	4.71	2.80	4.04	2.63	3.60	1.55	3.30	1.47	0.95	-2.85	-1.67
WHEAT	28.25	21.93	24.30	20.36	51.65	30.75	45.98	29.90	90.90	39.12	86.16	38.39	-2.80	-2.20	1.04
BARLEY	7.18	5.57	5.22	4.37	7.48	4.45	5.61	3.65	3.62	1.56	3.30	1.47	-5.43	-5.00	-1.76
OTHER CEREALS	13.27	14.03	12.82	10.74	5.83	8.54	5.21	3.39	6.49	4.05	5.59	2.49	-0.67	-2.13	-2.77
ALL CEREALS	103.88	80.63	95.61	80.11	134.52	80.10	120.99	78.67	206.19	88.74	199.87	89.05	-1.59	-2.01	-0.61
URD	3.96	3.07	3.38	2.83	9.64	5.74	9.59	6.24	10.49	4.51	10.83	4.83	-2.95	-0.10	0.64
MASOOR	9.75	7.57	7.80	6.54	14.91	8.88	13.38	8.70	11.76	5.06	9.58	4.27	-4.00	-2.05	-3.71
GRAM AND PEAS	5.82	4.52	7.12	5.97	3.27	1.95	4.03	2.62	3.42	1.47	3.72	1.66	4.47	4.65	1.75
BHATT/ GAHAT & RAJMA	5.41	4.20	5.44	4.56	5.60	3.33	5.81	3.78	0.48	0.21	0.44	0.20	0.11	0.75	0.02
PULSES	24.94	19.36	23.74	19.89	33.43	19.90	32.81	21.33	26.15	11.26	24.57	10.95	-0.96	.37	-1.20
TOTAL FOODGRAINS	128.83	100.00	119.35	100.00	167.95	100.00	153.80	100.00	232.34	100.00	224.44	100.00	-1.47	-1.68	-0.68

Among the various oilseeds grown in the State, the Soyabean in high and middle hill areas and mustard in low hill areas are the dominant crops in terms of the proportion of area

being used under the production of respective oilseeds to gross area of all oilseeds is concerned. The area under soyabean alone constitutes over 99 per cent in high hill areas and 70 per cent in middle hill areas. However, over the years the domination of soyabean have been loosing its ground in terms of both in its share in the gross cropped area as well as growth pattern in its area. The proportion of cropped area under soyabean has declined from 20.08 per cent in 1997 to 16.7 per cent in 2002 while its area has declined at the rate of 3.36 per cent per annum during the same period. On the other, the share of area under mustard has increased from 42 per cent in 1997 to 48 per cent in 2002 while its area has also been declining at the rate of 1.72 per cent annually. In all, the gross cropped area under different oilseeds together has been declining at the rate of 2.7 per cent, comprising at highest level in high hills (3.6 per cent) followed by 3.20 per cent in low hills and lowest at 1.20 per cent in middle hills.

The land use pattern under the production of different spices has been presented in Table 4.2(c). The main spices grown in the State include ginger, chilly, capsicum, garlic, turmeric and coriander. However, the ginger is found as the principle spice crop which is largely grown in middle hills. It occupies the share of around 72 per cent in the gross cropped area of all spices. In fact the area under ginger has been increasing at the rate of 4.70 per cent annually. The chilly and capsicum are the second most important spices which are grown in almost the areas of the State. Over the years, the growing of chilly and capsicum have been receiving a greater popularity in each of the geographical locations. Hence, the area under these spices together has been increasing at the rate of 3.15 per cent with a highest level of around 6 per cent in low hill areas followed by 3.22 per cent in middle and 2.22 per cent in high hill areas.

Further the analysis on the land use pattern under various fruits across different geographical locations is presented in Table 4.2(c). It may be noted that the hilly areas of the State, especially high and middle hill areas have certain comparative advantages over the plain areas and low hill areas in terms of growing various temperate, tropical and sub-tropical fruits throughout the year. In fact, certain fruits which can be successfully grown in high and middle hill areas the same can not be grown in low hill areas. Similar is the situation emerges in terms of fruits such as litchi and mango which can not be grown in high hill areas. These differences largely prevail due to the extent of variations exist in climatic condition, temperature, etc. among different areas. As a result of larger and favourable advantages provided by the nature for growing various fruits during a whole year in favour of high hills the cropped area under the fruits in high hills has been noted many-folds higher than the case of middle and low hill areas. In fact the share of fruits such as peaches and apple, which are, only grown in high hill areas together has alone been reported as high as 55 per cent in the total fruits area. Mango, plum, apricot, pear and litchi are the remaining principle fruits grown in different parts of the State.

The mango and litchi are the two important fruits grown in low and middle hill areas, while the apple has been the dominating fruit crop grown in high hill areas, for the past several centuries, but the area under apple has been consistently narrowing down while it has been subsequently increasing under the production of peaches and plums during the recent past. Similarly, the area under mango has been declining while it has been increasing under litchi in middle hill areas but in low hill areas the cropped area under both the fruits have been consistently increasing. On the whole the areas under mango and litchi has been increasing at the rate of 1.60 per cent and 2.06 per cent respectively while the area under apple has been declining at the rate of 1.60 per cent as against an increasing trend of 5.25 per cent revealed in case of area under peaches in the sample areas.

Table 4.2 (c) : **Cropping pattern of oilseeds and spices in different locations**
(Area in hectares)

CROPS	HIGH HILLS				MIDDLE HILLS				LOW HILLS				PERCENTAGE CHANGE		
	1997		2002		1997		2002		1997		2002		HIGH HILLS	MIDDLE HILLS	LOW HILLS
	AREA	PERCENTAGE	AREA	PERCENTAGE	AREA	PERCENTAGE	AREA	PERCENTAGE	AREA	PERCENTAGE	AREA	PERCENTAGE	1997-2002	1997-2002	1997-2002
MUSTARD	0.00	0.00	0.00	0.00	2.72	27.64	2.28	24.73	6.80	42.45	6.42	47.63	0.00	-16.18	-5.59
LAHI	0.00	0.00	0.00	0.00	0.50	5.08	0.40	4.34	0.16	1.00	0.16	1.19	0.00	-20.00	0.00
SOYABEEN	5.56	99.64	4.54	99.56	6.54	66.46	6.42	69.63	7.98	49.81	5.74	42.58	-18.35	-1.83	-28.07
OTHER OILSEEDS	0.02	0.36	0.02	0.44	0.08	0.81	0.12	1.30	1.08	6.74	1.16	8.61	0.00	50.00	7.41
OILSEEDS	5.58	100.00	4.56	100.00	9.84	100.00	9.22	100.00	16.02	100.00	13.48	100.00	-18.28	-6.30	-15.86
GINGER	0.00	0.00	0.00	0.00	9.20	78.23	11.36	79.94	0.00	0.00	0.00	0.00	0.00	23.48	0.00
CAPSICUM/ CHILLIES	0.90	100.00	1.00	100.00	1.80	15.31	2.09	14.71	0.28	58.33	0.36	60.00	11.11	16.11	28.57
OTHER SPICES	0.00	0.00	0.00	0.00	0.86	7.31	0.84	5.91	0.26	54.17	0.34	56.67	0.00	-2.33	30.77
SPICES	0.90	100.00	1.00	100.00	11.76	100.00	14.21	100.00	0.48	100.00	0.60	100.00	11.11	20.83	25.00

As revealed in earlier analysis that the utilisation of land under the production of off-season vegetables has been receiving a quite greater attraction as compared to remaining high value crops as fruits, spices, oilseeds and other non-food crops in different geographical locations during the recent past. Further, considering into account the prevailing land use pattern under the production of individual vegetable crops as presented in Table 4.2(e) it revealed that the potato is a most important vegetable crop among the various vegetables

grown in different geographical locations. As the proportion of cropped area under potato to gross cropped area of all vegetables has been noted over 63 per cent, comprising 81 per cent in high hill followed by 59 per cent in low and 16 per cent in middle hill areas. In fact, the cropped area under potato has been consistently increasing in each of the locations. Other main vegetables grown in the State comprises of onion, tomato, cabbage and arum. However, between the period 1997 to 2002, the proportion of area under tomato, cabbage and arum in middle hills and high hills and for onion and arum in low hills has been narrowing down at significant level. Contrary to these revealed facts of decreasing share of crop land of certain vegetables the analysis further points out that the actual cropped area under all the vegetables grown in different geographical locations is on the increase. Though, the annual growth trend in area under onion has been recorded highest at 6.17 per cent. In fact it is recorded fairly highest at 9.44 per cent in high hills followed by 6.34 per cent in middle hills and at lowest level of 5.27 per cent in low hills. The area under potato, which is the principal vegetable, has been growing at the rate of 4.57 per cent, consisting at around 8 per cent in each middle and low hills and 3 per cent in high hills. The cropped area under remaining vegetables such as tomato, cabbage and arum has shown an increasing trend of 5.23 per cent, 3.17 per cent and 3.66 per cent respectively during the period 1997 to 2002.

Table: 4.2 (d): **Cropping Pattern Of Fruits In Different Locations**

(Area in hectare)

CROPS	HIGH HILLS				MIDDLE HILLS				LOW HILLS				PERCENTAGE CHANGE		
	1997		2002		1997		2002		1997		2002		HIGH HILLS	MIDDLE HILLS	LOW HILLS
	AREA	PERCENTAGE	AREA	PERCENTAGE	AREA	PERCENTAGE	AREA	PERCENTAGE	AREA	PERCENTAGE	AREA	PERCENTAGE	1997-2002	1997-2002	1997-2002
MANGO	0.02	0.03	0.02	0.03	1.15	35.28	1.25	34.34	7.60	63.65	8.22	62.94	0.00	-94.78	8.16
PEACH	18.32	28.69	23.15	33.48	0.06	1.84	0.06	1.65	0.00	0.00	13.89	106.36	26.36	0.00	0.00
APPLE	25.87	40.51	23.79	34.40	0.08	2.45	0.08	2.20	0.00	0.00	0.00	0.00	-8.04	0.00	0.00
APRICOT	5.44	8.52	5.29	7.65	0.16	4.91	0.18	4.95	0.00	0.00	0.00	0.00	-2.76	12.50	0.00
PEAR	4.55	7.12	4.63	6.70	0.27	8.28	0.27	7.42	0.00	0.00	0.00	0.00	1.76	0.00	0.00
PLUM	9.12	14.28	10.81	15.63	0.11	3.37	0.11	3.02	0.00	0.00	0.00	0.00	18.53	0.00	0.00
LEETCHI	0.00	0.00	0.00	0.00	0.27	8.28	0.27	7.42	3.80	31.83	4.22	32.31	0.00	0.00	11.05
OTHER FRUITS	0.55	0.86	0.54	0.78	1.17	35.89	1.43	39.29	0.54	4.52	0.62	4.75	-1.82	22.22	14.81
FRUITS	63.86	100.00	69.15	100.00	3.26	100.00	3.64	100.00	11.94	100.00	13.06	100.00	8.28	11.66	9.38

Table: 4.2 (e): **Cropping Pattern Of Vegetables In Different Locations**

(Area in hectare)

CROPS	HIGH HILLS				MIDDLE HILLS				LOW HILLS				PERCENTAGE CHANGE		
	1997		2002		1997		2002		1997		2002		HIGH HILLS	MIDDLE HILLS	LOW HILLS
	AREA	PERCENTAGE	AREA	PERCENTAGE	AREA	PERCENTAGE	AREA	PERCENTAGE	AREA	PERCENTAGE	AREA	PERCENTAGE	1997- 2002	1997- 2002	1997- 2002
POTATO	32.39	80.59	36.43	80.74	11.42	41.11	15.87	43.77	9.92	57.61	13.70	58.70	12.47	38.97	38.10
ONION	0.72	1.79	1.06	2.35	7.44	26.78	9.80	27.03	4.02	23.34	5.08	21.77	47.22	31.72	26.37
TOMATO	0.32	0.80	0.32	0.71	1.40	5.04	1.50	4.14	0.42	2.44	0.88	3.77	0.00	7.14	109.52
CABBAGE	5.15	12.81	5.39	11.95	3.82	13.75	4.95	13.65	0.30	1.74	0.40	1.71	4.66	29.58	33.33
OTHER VEGETABLES	1.61	4.01	1.92	4.26	3.70	13.32	4.14	11.42	2.56	14.87	3.28	14.05	19.25	11.89	28.13
VEGETABLES	40.19	100.00	45.12	100.00	27.78	100.00	36.26	100.00	17.22	100.00	23.34	100.00	12.27	30.53	35.54

(iii) **Across the Size Categories of Farms:** Looking at the cropping pattern by size categories of farms the analysis presented in Table 4.3 further highlights the fact that irrespective of the availability of a very small size of holdings with the farming households all categories of them have been allocating a very high proportion of their cultivated land area under the production of foodgrains. In fact the proportion of land being used for growing foodgrains has been recognized highest for the farmers with bottom farm groups (68.47 per cent) followed by medium (62.40 per cent) and upper (58 per cent) farm groups households. At the same time the proportion of cropped area under the production of high value and market oriented crops such as vegetables, spices and vegetables has been consistently declining with the every increase of the size of land holdings. A major proportion of land available with relatively upper land holders of above 2.0 hectares have been used for producing foodgrains and non-food crops such as sugarcane, tobacco and turmeric while the proportion of area to total cropped area that has been put under the production of fruits, vegetables and spices by bottom and medium farm holders has been noticed much higher than the case of upper farm holders. The most important facts which have been emerging over the years are that the proportion of land area under the production of foodgrains has been rapidly declining and it's shift into the production of vegetables, fruits and spices has been boosting up in cases of both bottom and medium size categories of farms while for relatively upper size

Table: 4.3: **Cropping Pattern of Major Crops By Size Of Holding**

(Area in hectare)

CROPS	BELOW 1.00				1.00 - 2.00				2.00 AND ABOVE				PERCENTAGE CHANGE		
	1997		2002		1997		2002		1997		2002		BELO W 1.00	1.00 - 2.00	2.00 & ABOVE
	AREA	PERCENTAGE	AREA	PERCENTAGE	AREA	PERCENTAGE	AREA	PERCENTAGE	AREA	PERCENTAGE	AREA	PERCENTAGE	1997- 2002	1997- 2002	1997- 2002
TOTAL FOODGRAINS	388.45	72.37	364.46	68.44	99.80	65.66	93.58	62.40	40.86	56.70	39.56	58.02	-6.18	-6.23	-3.18
TOTAL OILSEEDS	20.30	3.78	17.76	3.34	7.76	5.11	6.92	4.61	3.38	4.69	2.58	3.78	-12.51	-10.82	-23.67
TOTAL SPICES	9.56	1.78	11.55	2.17	3.48	2.29	4.16	2.77	0.10	0.14	0.10	0.15	20.82	19.54	0.00
TOTAL VEGETABLES	65.31	12.17	81.78	15.36	14.94	9.83	17.02	11.35	4.94	6.86	5.92	8.68	25.22	13.92	19.84
TOTAL FRUITS	49.70	9.26	53.29	10.01	21.32	14.03	23.44	15.63	8.04	11.16	9.12	13.38	7.22	9.94	13.43
NON-FOOD CROPS	3.42	0.64	3.42	0.64	4.70	3.09	4.84	3.23	14.74	20.46	10.90	15.99	0.00	2.98	-26.05
GROSS CROPPED AREA	536.75	100.00	532.52	100.00	152.00	100.00	149.96	100.00	72.06	100.00	68.18	100.00	-0.79	-1.34	-5.38

of farms the area under the production of both traditional foodgrains as well as certain high value crops such as fruits, vegetables and spices is still on the increase while a considerable decreasing trend can be seen in the proportion of area under the production of various commercial crops such as oilseeds and other non-food crops, vegetables and spices in this size of farms during the recent past. On the whole the gross cropped area under the foodgrains has been decreasing at the rate of 1.22 per cent. This decreasing trend has again been visualised at fairly larger level for bottom farms (1.27 per cent) and at lowest level of 0.64 per cent for upper farms. The indirect implications of declining crop land under the production of foodgrains can be well visualised in terms increasing land area into the production of high value crops in each of the categories of farms. The increase in the area under various high value crops ranges highest at 4.21 per cent for vegetables followed by 3.77 per cent for spices and 1.66 per cent for fruits during the period 1997 to 2002. However, the cropped area under oilseeds has been on the declining situation in each of the farm categories.

Looking at the share of individual food crops in the gross cropped area of foodgrains it seems that the rice and wheat are the most important crops, which are grown in the crop season of kharif and rabi respectively. However, over the years, the share of wheat has been narrowing down while it has been subsequently increasing for rice in each size category of farms. The proportion of cropped area in total area under all foodgrains again constituted at highest level of around 89 per cent for upper farms as against 84 per cent for bottom farm groups and this share is still on the increase in the latter farm groups and on the declining rate in former farm

groups. Further, it seems that the masoor and urd are the two main pulses grown respectively during rabi and kharif crop seasons. But the cropped area under both the pulses has been reported considerably declining in each category of farms. However, the area under peas has been widening in each farm groups during the recent past. Further, the analysis revealed that the cropped area under the almost the traditionally grown food crops has been significantly decreasing in each of the category of farms. Only exception is the case of cropped area under rice has been increasing at the rate of 0.94 per cent in the upper and 0.14 per cent in medium farm groups.

Table: 4.3 (a): **Cropping Pattern Of Foodgrains By Size Of Holding**

(Area in Hects)

CROPS	Below 1.00				1.00 - 2.00				2.00 And Above				Percentage Change		
	1997		2002		1997		2002		1997		2002		BELOW 1.00	1.00 - 2.00	2.00 AND ABOVE
	Area	Percentages	Area	Percentages	Area	Percentages	Area	Percentages	Area	Percentages	Area	Percentages	1997-2002	1997-2002	1997-2002
PADDY	126.71	32.62	123.98	34.02	28.60	28.66	28.80	30.78	17.10	41.85	17.90	45.25	-2.15	0.70	4.68
MANDUA	33.09	8.52	28.96	7.95	7.54	7.56	6.62	7.07	0.54	1.32	0.26	0.66	-12.48	-12.20	-51.85
SAWAN	13.35	3.44	12.88	3.53	2.88	2.89	2.78	2.97	0.12	0.29	0.10	0.25	-3.52	-3.47	-16.67
WHEAT	123.26	31.73	113.38	31.11	30.94	31.00	27.62	29.51	16.60	40.63	15.44	39.03	-8.02	-10.73	-6.99
BARLEY	12.82	3.30	9.51	2.61	5.18	5.19	4.40	4.70	0.28	0.69	0.22	0.56	-25.82	-15.06	-21.43
OTHER CEREALS	18.66	4.80	17.51	4.80	5.46	5.47	4.92	5.26	1.46	3.57	1.20	3.03	-6.16	-9.89	-17.81
ALL CEREALS	327.89	84.41	306.22	84.02	80.60	80.76	75.14	80.29	36.10	88.35	35.12	88.78	-6.61	-6.77	-2.71
URD	17.18	4.42	17.02	4.67	4.60	4.61	4.48	4.79	2.32	5.68	2.30	5.81	-0.93	-2.61	-0.86
MASOOR	27.50	7.08	23.02	6.32	6.82	6.83	6.08	6.50	2.10	5.14	1.66	4.20	-16.29	-10.85	-20.95
PEAS AND GRAM	8.29	2.13	10.21	2.80	4.00	4.01	4.40	4.70	0.22	0.54	0.26	0.66	23.16	10.00	18.18
BHATT/GAHAT AND RAJMA	7.59	1.95	7.99	2.19	3.78	3.79	3.48	3.72	0.12	0.29	0.22	0.56	5.27	-7.94	83.33
PULSES	60.56	15.59	58.24	15.98	19.20	19.24	18.44	19.71	4.76	11.65	4.44	11.22	-3.83	-3.96	-6.72
ALL FOODGRAINS	388.45	100.00	364.46	100.00	99.80	100.00	93.58	100.00	40.86	100.00	39.56	100.00	-6.18	-6.23	-3.18

Analyzing the structure of cropping pattern of different oilseeds it is noted that the proportion of area being used under the production of soyabean has been reported fairly much larger as compared to the mustard in all groups of farms. Over the years the share of soyabean in gross cropped area of oilseeds has been declining in all the groups of farms but for mustard, it has been increasing in both medium and upper farm groups with a marginal decline in bottom farm groups. Further we find that excepting the case of area under mustard oil in upper farm groups, the area under all the remaining oilseeds has shown a declining trend during the period 1997-2002. In fact the highest rate of decrease in cropped area has been reported for soyabean that too in upper farm groups (8 per cent).

Further the analysis on the emerging cropping pattern of various spices and the share of individual spice in the total cropped area of spices revealed that the bottom and medium farm groups of households have been using a major land area under the production of ginger, chilly and capsicum, while the upper farm households are seen only growing the chilly and capsicum. Other spices grown by bottom and medium farm households are turmeric, coriander and garlic. Over the years, a fairly significant increase in the area under all the spices which are grown in the sample areas has been well recognized. Both bottom and medium farm groups of households are seen increasingly shifting their land into the production spices, especially for growing chilly, ginger and capsicum while the upper farm households who have been only involved in growing chilly, the area under concerned crop has been constantly increasing since 1997.

Table: 4.3 (b): **Cropping Pattern Of Oilseeds And Spices By Size Of Holdings**
(Area in Hects)

CROPS	BELOW 1.00				1.00 - 2.00				2.00 AND ABOVE				PERCENTAGE CHANGE		
	1997		2002		1997		2002		1997		2002		BELOW 1.00	1.00 - 2.00	2.00 & ABOVE
	Area	Percentage	Area	Percentage	Area	Percentage	Area	Percentage	Area	Percentage	Area	Percentage	1997- 2002	1997- 2002	1997- 2002
MUSTARD	6.62	32.61	5.76	32.43	1.90	24.48	1.84	26.59	1.00	29.59	1.10	42.64	-12.99	-3.16	10.00
LAHI	0.22	1.08	0.22	1.24	0.28	3.61	0.20		0.16	4.73	0.14	5.43	0.00	-28.57	-12.50
SOYABEEN	12.48	61.48	10.70	60.25	5.38	69.33	4.66	67.34	2.22	65.68	1.34	51.94	-14.26	-13.38	-39.64
OTHER OILSEEDS	0.98	4.83	1.08	6.08	0.20	2.58	0.22	3.18	0.00	0.00	0.00	0.00	10.20	10.00	0.00
OILSEEDS	20.30	100.00	17.76	100.00	7.76	100.00	6.92	100.00	3.38	100.00	2.58	100.00	-12.51	-10.82	-23.67
GINGER	6.40	66.95	7.98	69.09	2.80	80.46	3.38	81.25	0.00	0.00	0.00	0.00	24.69	20.71	0.00
CHILLIES	2.44	25.52	2.78	24.07	0.44	12.64	0.62	14.90	0.10	100.00	0.10	100.00	13.93	40.91	0.00
OTHER SPICES	0.78	8.16	0.92	7.97	0.34	9.77	0.26	6.25	0.00	0.00	0.00	0.00	17.95	-23.53	0.00
SPICES	9.56	100.00	11.55	100.00	3.48	100.00	4.16	100.00	0.10	100.00	0.10	100.00	20.82	19.54	0.00

As indicated in the preceding part that the peaches and apple, which are grown largely in high hill areas, and to a some extent in middle hill areas, the area under both the fruits has consistently increasing over the years. Also the proportion of land area being utilized under the production of these both fruits is negatively related to the size of farms. Proportionate of cropped area under apple and peaches to gross cropped area of the fruits has been reported to 31 per cent and 28 per cent respectively for bottom size categories of farms as against only 8 per cent and 16 per cent respectively for upper farm households. It indicates that the tiny

farmers are more reluctant to use their available land under the production of universally known specialized and highly profitable fruits to be grown in their areas as compared to farmers owned relatively larger size of holdings. The upper farm households have been putting a highest proportion of their available land in the production of litchi (32 per cent) and mango (30 per cent) while the share of land area under both the fruits have been narrowing down significantly and its shift can be well visualised in the production of peaches which cropped area has increased from 11 per cent in 1997 to 16 per cent in 2002. In all the proportion of area under the production of apple has been greatly declining and its diversion into the production of peaches has been highly reflecting in each groups of farms during the recent past.

Table: 4.3 (c): **Cropping Pattern Of Fruits By Size Of Holdings**

(Area in Hects)

CROPS	BELOW 1.00				1.00 - 2.00				2.00 AND ABOVE				PERCENTAGE CHANGE		
	1997		2002		1997		2002		1997		2002		BELOW 1.00	1.00 - 2.00	2.00 & ABOVE
	Area	Percentage	Area	Percentage	Area	Percentage	Area	Percentage	Area	Percentage	Area	Percentage	1997-2002	1997-2002	1997-2002
MANGO	4.01	8.07	4.33	8.13	2.26	10.60	2.40	10.24	2.50	31.09	2.76	30.26	7.98	6.19	10.40
PEACH	11.42	22.98	14.83	27.83	6.06	28.42	7.82	33.36	0.90	11.19	1.50	16.45	29.86	29.04	66.67
APPLE	18.19	36.60	16.73	31.39	7.00	32.83	6.44	27.47	0.76	9.45	0.70	7.68	-8.03	-8.00	-7.89
APRICOT	3.88	7.81	3.77	7.07	1.54	7.22	1.58	6.74	0.18	2.24	0.12	1.32	-2.84	2.60	-33.33
PEAR	3.94	7.93	4.00	7.51	0.74	3.47	0.80	3.41	0.14	1.74	0.10	1.10	1.52	8.11	-28.57
PLUM	5.37	10.80	6.15	11.54	2.96	13.88	3.62	15.44	0.90	11.19	1.14	12.50	14.53	22.30	26.67
LEETCHI	1.07	2.15	1.39	2.61	0.44	2.06	0.40	1.71	2.56	31.84	2.70	29.61	29.91	-9.09	5.47
OTHER FRUITS	1.82	3.66	2.09	3.92	0.32	1.50	0.38	1.62	0.10	1.24	0.10	1.10	14.84	18.75	0.00
FRUITS	49.70	100.00	53.29	100.00	21.32	100.00	23.44	100.00	8.04	100.00	9.12	100.00	7.22	9.94	13.43

Thus, it seems that the farmers in every locations, irrespective of the size of land they are possessing, are showing a great and impressive importance in shifting their available land areas into the production of peaches. As a result, the cropped area under the production of peaches has shown an appreciable increasing trend in each of the categories of farms between the period 1997 to 2002. The cropped area under mango, litchi and plums has also been increased significantly in each of the farm groups during the same period. This indicates the fact that farmers owning different sizes of holdings are well aware in maximising benefits from using their available land under different profitable options. Increasing attention have been provided by each farm categories of farmers especially tiny farmers to divert their available land from the

production of less profitable and higher risky food crops or fruits to higher profitable and less risky crops which may be successfully grown in particular geographical locations.

As far as the emerging situation related to the cropping pattern of different vegetables is concerned, the analysis presented in Table 4.3(d) depicts that the farmers with different size categories of holdings are providing a highest proportion of vegetable area under the production of potato, ranging lowest from 61 per cent for upper farm groups to highest at 66 per cent for medium farm groups. In fact, the share in total cropped area as well as growth pattern in area of potato have shown a considerable increasing trend with a substantial, variations ranging lowest from 4.73 per cent in bottom farm groups to highest at 7.31 per cent in upper farm groups. Another important vegetables grown by the farming households in sample areas included as tomato onion and cabbage. The area under the production of most of these vegetables especially for onion and tomato has also been boosting up at a remarkable level, indicating as high as 14 per cent for tomato for medium size categories of farms and around 8 per cent for onion for favour of bottom size categories of farms.

Table 4.3 (d) **Cropping Pattern of Vegetables by Size of Holdings**

CROPS	Below 1.00				1.00 - 2.00				2.00 And Above				Percentage Change		
	1997		2002		1997		2002		1997		2002		BEL OW 1.00	1.00 - 2.00	2.00 & ABOVE
	AREA	PERCENTAGES	AREA	PERCENTAGES	AREA	PERCENTAGES	AREA	PERCENTAGES	AREA	PERCENTAGES	AREA	PERCENTAGES	1997 - 2002	1997 - 2002	1997 - 2002
POTATO	41.37	63.34	51.14	62.53	9.68	64.79	11.20	65.80	2.68	54.25	3.66	61.82	23.62	15.70	36.57
ONION	9.48	14.52	13.06	15.97	1.44	9.64	1.60	9.40	1.26	25.51	1.28	21.62	37.76	11.11	1.59
TOMATO	1.80	2.76	2.16	2.64	0.14	0.94	0.24	1.41	0.20	4.05	0.30	5.07	20.00	71.43	50.00
CABBAGE	6.97	10.67	8.36	10.22	2.12	14.19	2.18	12.81	0.18	3.64	0.20	3.38	19.94	2.83	11.11
ARUM	2.72	4.16	3.38	4.13	0.56	3.75	0.56	3.29	0.20	4.05	0.20	3.38	24.26	0.00	0.00
OTHER VEGETABLES	2.97	4.55	3.68	4.50	0.98	6.56	1.24	7.29	0.42	8.50	0.28	4.73	23.91	26.53	-33.33
OTHER VEGETABLES	5.69	8.71	7.06	8.63	1.54	10.31	1.80	10.58	0.62	12.55	0.48	8.11	24.08	16.88	-22.58
VEGETABLES	65.31	100.00	81.78	100.00	14.94	100.00	17.02	100.00	4.94	100.00	5.92	100.00	25.22	13.92	19.84

STRUCTURE OF PRODUCTION

(I) **At State Level:** Considering into account the production structure, especially the contribution of different foodgrains, oilseeds, vegetables, fruits and various other non-foodgrains in the aggregate quantum of production being derived in the State, the analysis presented in Table 4.4 depicts that the contribution of non-food crops, which include sugarcane, tobacco, etc. constitutes a very high level of over 72 per cent, despite the fact that the share of concerned crops in gross cropped accounted only 8 per cent. This larger share has also examined due to a very high quantum of production size of sugarcane which production is concentrated only in plain areas of Dehradun, Udham Singh Nagar and Haridwar. The contribution of foodgrain production accounted for little over 17 per cent during 1997 to 2000, though it was indicated relatively higher at 19.67 per cent in 1992-95. The more surprising facts which persisting over the years are that despite a consistently increasing trend revealed in the share of area under pulses and oilseeds at State level the share of production of pulses has declined from 0.28 per cent in 1992-95 to 0.23 per cent in 1997-2000, with a negative growth of 2.11 per cent during 1992-95 to 1997-2000 in the size of production. Also, the growth trend in the production of oilseeds has reduced from 5.59 per cent during 1987-90 to 1992-95 to merely 1.48 per cent during 1992-95 to 1997-2000. Similarly the share of all high value crops, such as oilseeds, fruits and vegetables in the gross production of both food and non-food crops together has been consistently increasing though the corresponding share of fruits has been widening to a highest level as compared to remaining two crops, despite the fact that the share in area of fruits has been increasing to a relatively lesser extent than the case of vegetables. However, despite a significant trend revealed in the growth trend of production in the cases of all vegetables, fruits and oilseeds, their compound growth rate for the period 1992-95 to 1997-2000 have been reported fairly at lower level as compared to the earlier period of 1987-90 to 1992-95. And a narrowing down trend of growth rate has been appeared in case of oilseeds during the same points of duration.

Further, it has been pointed out that despite a considerably larger decreasing trend revealed in the gross cropped area the quantum of aggregate production of all food and non-food crops together has been increasing at a significant level of 1.90 per cent annually in the State. However, the growth trend in relation to the production of foodgrains has substantially declined which may be the indirect reflection of overall declining trend revealed in the cropped area under the production of foodgrains and the increasing shift of better quality irrigated and productive land area into the production of high value crops over the years. The annual production of all foodgrains have been declining at the rate of 0.48 per cent, though this declining rate is much lower as compared to the extent that the area under foodgrains has declined during the same period.

Table:4.4: **Production Structure Of Crops At The State Level**

(Production in Qntl)

CROPS	1987-90		1992-95		1997-2000		Compound Growth Rate	
							1987-90 to 1992-95	1992-95 to 1997-2000
	Production	Percentage	Production	Percentage	Production	Percentage	Production	Production
FOODGRAINS	1624155	18.40	1697845	19.67	1657448	17.48	0.89	-0.48
OILSEEDS	31183	0.35	40921	0.47	44039	0.46	5.59	1.48
VEGETABLES	239000	2.71	325650	3.77	391270	4.13	6.38	3.74
FRUITS	398000	4.51	469511	5.44	529199	5.58	3.36	2.42
NON-FOOD CROPS	6532465	74.02	6096855	70.64	6859410	72.35	-1.37	2.38
TOTAL PRODUCTION	8824803	100.00	8630782	100.00	9481366	100.00	-0.44	1.90

Source: 1) Agricultural Statistics of U.P for respective years, Krishi Bhavan, Lucknow

2) Statistical Abstracts for respective years, Economics and Statistics Department, Lko.

Table 4.4(a): **Production Structure Of Major Foodgrains At The State Level**

(Production in Qntl)

CROPS	1987-90		1992-95		1997-2000		Compound growth rate	
							1987-90 to 1992-95	1992-95 to 1997-2000
	Production	Percentage	Production	Percentage	Production	Percentage	Production	Production
RICE	548624	33.78	578346	34.06	566398	34.17	1.06	-0.42
MADUA	163908	10.09	173197	10.20	177188	10.69	1.11	0.46
SAWAN	78797	4.85	87227	5.14	88888	5.36	2.05	0.38
WHEAT	705969	43.47	749731	44.16	733228	44.24	1.21	-0.44
BARLEY	59065	3.64	42703	2.52	26656	1.61	-6.28	-8.99
OTHER_CEREALS	45473	2.80	42467	2.50	43356	2.62	-1.36	0.42
ALL CEREALS	1601836	98.63	1673671	98.58	1635714	98.69	0.88	-0.46
ALL PULSES	22319	1.37	24174	1.42	21734	1.31	1.61	-2.11
ALL FOODGRAINS	1624155	100.00	1697845	100.00	1657448	100.00	0.89	-0.48

Source: 1) Agricultural Statistics of U.P for respective years, Krishi Bhavan, Lucknow

2) Statistical Abstracts for respective years, Economics and Statistics Department, Lko.

Table:4.5: **Emerging Production Structure of Crops Based On Sample Data**

(Production in Qntl)

CROPS	1997		2002		ANNUAL GROWTH
	PRODUCTION	PERCENTAGE	PRODUCTION	PERCENTAGE	1997 TO 2002
PADDY	3142.19	10.38	2673.99	7.98	-2.98
MADUA	616.64	2.04	570.15	1.70	-1.51
SAWAN	439.97	1.45	384.53	1.15	-2.52
WHEAT	3152.38	10.42	3022.61	9.03	-0.82
BARLEY	256.72	0.85	142.62	0.43	-8.89
OTHER CEREALS	1101.47	3.64	1191.27	3.56	1.63
ALL CEREALS	8709.37	28.78	7985.17	23.84	-1.66
PULSES	1124.22	3.71	1595.65	4.76	8.39
ALL FOODGRAINS	9833.59	32.49	9580.82	28.61	-0.51
OILSEEDS	723.07	2.39	804.87	2.40	2.26
SPICES	1274.95	4.21	1759.53	5.25	7.60
FRUITS	3987.53	13.18	4708.30	14.06	3.62
VEGETABLES	3994.25	13.20	5380.51	16.07	6.94
NON-FOOD CROPS	10452.00	34.53	11254.60	33.61	1.54
TOTAL PRODUCTION	30265.39	100.00	33488.63	100.00	2.13

A look at the share of different food crops in the gross production of all foodgrain revealed that the domination of wheat and rice in terms of their size of production has been well reflected but their share in gross production of foodgrain has been narrowing down to a significant level, especially after 1997-2000. In fact, during the period 1992-95 to 1997-2000 the size of production of both wheat and rice has annually declined by 0.44 per cent and 0.42 per cent respectively, though during the earlier period of 1987-90 and 1992-95 a positive growth trend of 1.21 per cent and 1.06 per cent has been revealed respectively for both wheat and rice. But the quantum of production of millets, such as, madua and sawan is still increasing at the rate of 0.46 per cent and 0.38 per cent respectively.

(ii) **Across the Regions:** Analyzing the primary data collected from different sample areas we also find a similar pattern is emerging as we found earlier in analyzing secondary data in terms of contribution and the changing characteristics of contribution of different foodgrains, fruits, oilseeds, vegetables and other non-food crops in the aggregate quantum of production being derived at the State level. According to both the sources of data the share of foodgrains in general and especially for principle food crops as rice and wheat has shown a declining trend while the share of various non-food high value crops has been consistently increasing during the recent past. Also, the aggregate production of foodgrains has been narrowing down while it has been unprecedently increasing for non-food crops. The growth pattern of foodgrains production has been declining at the rate of 0.51 per cent per annum. On the other hand the size of production of each high value crops have been increasing to the tune of ranging highest at 7.60

per cent for spices followed by 6.94 per cent for vegetables, 3.62 per cent for fruits, 2.26 per cent for oilseeds and 1.54 per cent for other non-food crops. Considerable increase in the area, (iii) mainly due to increasing shift of cropped area from the production of food crops to the production of various non-food crops as reflected over the years could be an important influencing factor in achieving such a high rate of growth performance in the production structure of latter groups of non-food crops during the recent past. Among the regions, the share of foodgrains in total production of all crops varies lowest at 26 per cent in low hills to highest at 37 per cent in middle hills while this share has been considerably falling down in each of the geographical locations. However, the revealed declining trend in the size of foodgrain production seems to be mainly due to its negative growth trend of 2.70 per cent that has found in middle hills. Otherwise, the size of foodgrain production in remaining high and low hill areas has been significantly increasing at the rate of 0.94 per cent and 0.32 per cent respectively. The second highest share in total production of all crops is represented by fruits in high hills, vegetables in middle hills and other non-food crops such as sugarcane, tobacco and turmeric in low hills.

Table: 4.5 (a): **Production Structure Of Different Crops By Geographical Locations**
(Production in Qntl)

Crops	High Hills				Middle Hills				Low Hills				Annual Growth During 1997-2002		
	1997		2002		1997		2002		1997		2002		High Hills	Middle Hills	Low Hills
	PROD	%	PROD	%	PROD	%	PROD	%	PROD	%	PROD	%	1997-2002	1997-2002	1997-2002
ALL FOODGRAINS	2731.78	34.02	2736.58	28.57	2455.39	46.02	2123.72	36.87	4646.41	27.49	4720.52	26.01	0.04	-2.70	0.32
OILSEEDS	75.06	0.93	71.99	100.00	151.16	2.83	244.89	100.00	496.85	2.94	487.99	100.00	-0.82	12.40	-0.36
SPICES	64.70	0.81	197.95	2.07	1186.50	22.24	1505.03	26.13	23.75	0.14	56.55	0.31	41.19	5.37	27.62
FRUITS	3293.84	41.02	3890.13	40.62	126.00	2.36	162.11	2.81	567.69	3.36	656.06	3.61	3.62	5.73	3.11
VEGETABLES	1863.88	23.21	2677.45	27.96	1416.75	26.55	1724.86	29.94	713.62	4.22	978.20	5.39	8.73	4.35	7.42
NON-FOOD CROPS	0.00	0.00	3.60	0.04	0.00	0.00	0.00	0.00	10452.00	61.84	11251.00	61.99	0.00	0.00	1.53
TOTAL PRODUCTION	8029.26	100.00	9577.70	100.00	5335.80	100.00	5760.61	100.00	16900.32	100.00	18150.32	100.00	3.86	1.59	1.48

The trend in the production of various high value crops is on the consistent increase in all the geographical locations. The high and low hill areas are found receiving specialization in growing different spices as the growth performance in the production of concerned crops has been increasing to a very high level of over 41 per cent in former areas and 27.62 per cent in latter areas. On the other hand, the farmers in middle hill area have been providing a great

interest in growing of oilseeds and the plantation of fruits as the annual growth rate of production of concerned products has been reported at 12.40 per cent and 5.73 per cent respectively during 1997 to 2002.

It has further been recognized that irrespective of a very limited cultivated land available with almost the farm households in different areas they all are very much involved in using their land simultaneously in the production of both cereals and pulses. However, the proportionate share of cereals stands relatively at much higher level as compared to the pulses in terms of their size of production as well as cropped area. However, considering into account the structure of production of both the crops individually in different areas the analysis postulates the facts that in total size of production of foodgrains the contribution of pulses has been consistently increasing while it has been narrowing down for cereals in each of the geographical locations during the recent past. Between the period 1997 to 2002, the size of production of cereals has shown a declining trend of 3 per cent in high hills and 4 per cent in middle hills while it has grown at the rate of only 0.01 per cent points in low hills. Contrary to this, the growth trend of pulses has picked up as high as 31 per cent in high hills followed by 3 per cent in low hills and 2 per cent in middle hills during the same period.

The size of production of almost the cereals has shown a declining trend in middle and high hill areas during 1997 and 2002. Similar has been the situation for paddy, madua and sawan in low hill areas during the same period. But a very high growth in the production (15 per cent) of barley has been estimated in low hill areas while its production has been declining at the rate of 16 per cent in high hills and 11 per cent in middle hills. Among the various pulses grown in different geographical locations, the production of peas and gram has been growing up to an appreciable manner in all the areas but to a highest level in high hills followed by middle and low hills while it has been declining considerably for masoor in all the areas. Similarly, the production of local pulses such as bhatt and gahat has been boosting up in high and middle hills while its negative growth trend has been reported in low hills.

The soyabean and mustard are the main oilseeds grown in the State. In fact, the size of production of both the oilseeds has been increasing at the rate of 1.91 per cent and 2.89 per cent respectively in the sample areas. But the production of soyabean has shown a declining trend in high and low hill areas at the rate of 0.84 per cent and 6 per cent respectively as against a very high growth rate of 16.40 per cent in middle hills. The production of mustard has also been declining in middle hill areas while it has been increasing in high and low hills. Lahi is another important oilseed grown in each of the geographical locations of the State. Its production has noted increasing to a certain level in high and low hills but it has been loosing in

middle hills. The other oilseeds as **alsi** and some local varieties of oilseeds are grown in a very low proportion of land area but their production has been growing to a significant level in each of the geographical locations.

Growing of different varieties and types of spices has also been an old tradition and it has been gaining importance further with the introduction of some additional types of spices such as ginger, garlic, etc. But almost the farmers are involved in growing of chilly which production has been picking up to a fairly larger level in all the geographical locations. The production of ginger seems to be undertaken only in middle hill areas where its share constituted over 84 per cent in the total production of spices. The size of production of other spices which cropped area constituted only 7 per cent in the area of all spices, has shown an increasing rate of around 6 per cent in low hills as against a declining trend of 2 per cent in middle hills.

The mountain and hilly areas of the State possess certain advantages and opportunities for favour of growing different types of fruits. Certain fruits grown in these areas can not be grown in the plain areas. Even certain fruits such as apple, peaches, apricot, pear, plum, etc. which can be successfully grown in high and middle hill areas can not be grown in low hill areas. Also the fruits such as mango, papaya and litchi can be grown in low hill areas and also in low

Table 4.5 (b) : Production of Foodgrain in Different Locations

(Production in Qntl.)

CROPS	HIGH HILLS				MIDDLE HILLS				LOW HILLS				ALL AREAS				ANNUAL GROWTH DURING 1997-2002		
	1997		2002		1997		2002		1997		2002		1997		2002		High Hills	Middle Hills	Low Hills
	PROD	%	PROD	%	PROD	%	PROD	%	PROD	%	PROD	%	PROD	%	PROD	%	1997-2002	1997-2002	1997-2002
																	2002	2002	2002
PADDY	282.68	10.35	242.48	8.86	732.91	29.85	501.19	23.60	2126.60	45.77	1930.33	40.89	3142.19	31.95	2673.99	27.91	-2.84	-6.32	-1.85
MADUA	451.05	16.51	430.09	15.72	102.89	4.19	92.08	4.34	62.70	1.35	47.98	1.02	616.64	6.27	570.15	5.95	-0.93	-2.10	-4.70
SAWAN	285.19	10.44	266.92	9.75	92.78	3.78	57.31	2.70	62.00	1.33	60.30	1.28	439.97	4.47	384.53	4.01	-1.28	-7.65	-0.55
WHEAT	572.41	20.95	378.90	13.85	837.49	34.11	750.87	35.36	1742.48	37.50	1892.84	40.10	3152.38	32.06	3022.61	31.55	-6.76	-2.07	1.73
BARLEY	109.39	4.00	21.62	0.79	105.09	4.28	46.61	2.19	42.24	0.91	74.38	1.58	256.72	2.61	142.62	1.49	-16.05	-11.13	15.22
OTHER CEREALS	796.96	29.17	796.67	29.11	118.88	4.84	176.43	8.31	185.63	4.00	218.17	4.62	1101.47	11.20	1191.27	12.43	-0.01	9.68	3.51
ALL CEREALS	2497.68	91.43	2136.68	78.08	1990.04	81.05	1624.49	76.49	4221.65	90.86	4224.00	89.48	8709.37	88.57	7985.17	83.35	-2.89	-3.67	0.01
URD	33.11	1.21	35.29	1.29	165.81	6.75	163.89	7.72	120.11	2.59	175.50	3.72	319.04	3.24	374.68	3.91	1.32	-0.23	9.22
MASOOR	86.63	3.17	62.14	2.27	206.79	8.42	130.99	6.17	231.89	4.99	155.32	3.29	525.31	5.34	348.45	3.64	-5.65	-7.33	-6.60
GRAM AND PEAS	28.28	1.04	261.45	9.55	24.32	0.99	118.51	5.58	40.49	0.87	158.50	3.36	93.08	0.95	538.46	5.62	164.90	77.46	58.29
RAJMA & BHATTI GAHAT	86.08	3.15	241.02	8.81	68.43	2.79	85.84	4.04	32.27	0.69	7.20	0.15	186.77	1.90	334.06	3.49	36.00	5.09	-15.54
PULSES	234.10	8.57	599.90	21.92	465.35	18.95	499.23	23.51	424.76	9.14	496.52	10.52	1124.22	11.43	1595.65	16.65	31.25	1.46	3.38
TOTAL FOOD-GRAINS	2731.78	100.00	2736.58	100.00	2455.39	100.00	2123.72	100.00	4646.41	100.00	4720.52	100.00	9833.59	100.00	9580.82	100.00	0.04	-2.70	0.32

altitude areas of mid hills but these can not be grown in high hills. Peaches and apple happen to be the dominant fruits in high hill areas in terms of their share in the gross cropped area as well as their contribution in the total size of production. However, the share of apple in total size of production of all fruits has been declining while it has been increasing significantly for peaches. But the size of production of both the fruits has been growing up considerably. Similarly the production of remaining fruits such as apricot, pear, nuts, walnut and oranges which are grown in high hills is also on the increase while it has been declining at the rate of 2.05 per cent for plums. The mango and litchi have been recognized as the dominant fruits both in middle and low hill areas. In fact the size of production of both the fruits has been significantly increasing in both the locations, though the share of mango in the total size of fruit production has marginally declined in low hill areas. However, the corresponding share of both the fruits has been increasing to a significant level in middle hill areas. In all the farmers in high hill have been specializing in growing of peaches and pears while the farmers of middle and low hill areas are mainly involved to boost the plantation of various fruit trees such as litchi, mango, guava and papaya which can not be grown in high hill areas.

Analysing the contribution pattern of individual vegetable crops in the total size of vegetable production we find that potato provides a leading share in each of the geographical locations, though its share varied highest from 81 per cent in high hill areas to lowest at 44 per cent in middle hill areas and 61 per cent in low hill areas. The onion seems to be the second most important vegetable grown in middle and low hill areas, where its share accounted for 30 per cent and 20 per cent respectively. However, inspite of a declining trend revealed in the contribution of potato in total vegetable production in middle hills the size of its production has been increasing to a very higher level in each of the geographical locations. In fact, the growth trend in the production of onion has also been revealed going up at much higher rate than the potato in all the geographical locations. The size of production of remaining major vegetables such as cabbage and tomato has also been moving up at a significant level in each locations. Only exceptions is the case of the production of other vegetables, which are mainly grown during the rainy season, has been narrowing down in low and middle hill areas but it has shown an increasing trend of around 7 per cent in high hill areas.

Over the years, the farmers in middle and high hill areas are indicated to be initiating for promoting the production of onion. Such is not in case of the farmers of low hill areas where increasing initiatives are being provided in boosting up the production of both potato and cabbage simultaneously.

Table: 4.5 (d): PRODUCTION STRUCTURE OF FRUITS IN DIFFERENT LOCATIONS

(Production in Qntl)

CROPS	HIGH HILLS				MIDDLE HILLS				LOW HILLS				ALL AREAS				ANNUAL GROWTH DURING 1997-2002			
	1997		2002		1997		2002		1997		2002		1997		2002		1997-2002		1997-2002	
	PROD	%	PROD	%	PROD	%	PROD	%	PROD	%	PROD	%	PROD	%	PROD	%	1997-2002	1997-2002	1997-2002	1997-2002
MANGO	0.00	0.00	0.00	0.00	27.08	21.49	36.95	22.79	408.12	71.89	445.91	67.97	435.20	10.91	482.86	10.26	0.00	7.29	1.85	2.19
PEACH	930.80	28.26	1373.51	35.31	3.90	3.10	5.10	3.15	0.00	0.00	0.00	0.00	934.70	23.44	1378.61	29.28	9.51	6.15	0.00	9.50
APPLE	1247.63	37.88	1300.85	33.44	4.32	3.43	5.01	3.09	0.00	0.00	0.00	0.00	1251.95	31.40	1305.86	27.74	0.85	3.19	0.00	0.86
APRICOT	262.02	7.95	349.78	8.99	7.23	5.74	9.00	5.55	0.00	0.00	0.00	0.00	269.25	6.75	358.78	7.62	6.70	4.90	0.00	6.65
PEAR	174.48	5.30	249.30	6.41	9.81	7.79	12.26	7.56	0.00	0.00	0.00	0.00	184.29	4.62	261.56	5.56	8.58	4.99	0.00	8.39
PLUM	648.04	19.67	581.69	14.95	6.09	4.83	6.98	4.31	0.00	0.00	0.00	0.00	654.13	16.40	588.67	12.50	-2.05	2.92	0.00	-2.00
LEITCHI	0.00	0.00	0.00	0.00	25.46	20.21	51.93	32.03	121.62	21.42	148.50	22.64	147.08	3.69	200.43	4.26	0.00	20.79	4.42	7.25
OTHER FRUITS	30.87	0.94	35.00	0.90	42.11	33.42	34.88	21.52	37.95	6.68	61.65	9.40	110.93	2.78	131.53	2.79	2.68	-3.43	12.49	3.71
FRUITS	3293.84	100.00	3890.13	100.00	128.00	100.00	162.11	100.00	567.69	100.00	656.06	100.00	3987.53	100.00	4708.30	100.00	3.62	5.73	3.11	3.62

Other Fruits- Oranges, Lemon, Nuts,
Walnut

(iii) **Across the Size Categories of Farms:** A look at the structure of production of different crops according to the size of farms as presented in Table 4.6 depicts an inverse relationship between the share of foodgrain production in gross crop production and the size of holdings. The share of foodgrain production comes highest at 39 per cent for bottom farm households followed by 20 per cent for medium and a lowest proportion of 10 per cent for upper farm households. Contrary to this the share of foodgrain production in bottom farms has been declining while it has been increasing in middle and upper farm groups during the recent past. The second most share in the gross crop production of bottom farms is constituted by vegetables (23 per cent) followed by fruits (16 per cent) while in medium and upper farm groups it revealed for non-food crops such as sugarcane and tobacco. But the share in gross crop production of both fruits and vegetables have been significantly increasing in bottom farm households and the reversal is a situation emerging in response to the share of non-food crops in the total crop production in both middle and low hill areas. In all, in the bottom farm groups the size of production has been recorded increasing at highest level in favour of spices 9.96 per cent followed by vegetables 6.79 per cent and fruits 3.13 per cent with a negative growth rate of over 5 per cent for oilseeds and 2 per cent for foodgrains between the period 1997 to 2002. On the other, in both upper and medium farm groups the production of foodgrains as well as fruits and vegetables has been considerably increasing. Over the years the total quantum of crop production has been increasing at a fairly highest level of 4.76 per cent in bottom farm groups followed by 2.24 per cent in upper and at lowest rate of 1.41 per cent in medium farm groups.

Further the presentation of emerging production structure of individual food crops and its changing pattern between the period 1997 and 2002 has been carried out in Table 4.6(a). The analysis revealed that the share of both principle crops, such as wheat and paddy, in the total size of production of foodgrains has considerably declined in almost the farm groups, exception is only that the share of wheat production has shown an increasing trend in upper farm-groups between the period 1997 to 2002. Moreover, a negative growth trend in the size of production of all cereals in bottom groups of farms madua and sawan in middle groups of farm and only for madua in upper farm groups has also been well visualised emerging over the years.

Similarly, despite a considerable decreasing trend revealed in the share of paddy and wheat in the total production of foodgrains, the size of production of both the cereals has shown a significant level of positive growth trend over the years. The size of production of barley has also been increasing at the rate of 8 per cent and 7 per cent in upper and medium farms groups respectively while its negative growth rate of 10.24 per cent is revealed in bottom farm groups.

Urd and masoor are as the principle pulses grown throughout the State. The share of both the pulses in total foodgrains production has been well strengthening further in different farm groups, except for masoor in bottom farm groups during the recent past. In fact, a negative growth trend in the size of production of both masoor and urd has been witnessed in the bottom farm groups between 1997 to 2002. On the other the production of both the pulses has shown a remarkable increase in medium and upper farm groups. In all the farm groups of households, especially bottom and medium farm households have been visualised taking increasing initiatives to boost up the Production of peas and grains. This has indicated by the fact that the trend of growth in the size of production of particular pulses has been picking up to a fairly much larger level as compared to remaining pulses in almost the farm groups. In particular to upper farm groups the highest growth rate of 110 per cent has been represented by local pulses such as bhatt, rajma and gahat followed by 61 per cent together by peas and grams and 53 per cent by urd. In all, the gross production of pulses has been increasing fairly to a larger level as compared to the cereals in both medium and upper farm groups as against a considerable declining trend revealed for both the cereals as well as pulses in the bottom size groups of farms.

A look at the production structure of different oilseeds and spices revealed that the volume of production of spices has shown a remarkable increase in almost the farm groups, with a stable growth pattern revealed in upper farm groups during 1997 to 2002. But, a reversal is the situation emerging in the growth pattern of the production of oilseeds, especially in medium farm groups, though a very high growth trend of around 4 per cent and 2 per cent has been estimated for concerned crops in bottom and upper farm groups respectively during the reference period. Despite a considerable declining trend revealed in the area under soyabean in almost the farm groups the size of production of concerned crop has been raising to a fairly larger extent of 5.46 per cent annually for bottom farm households, though it has been declining at the rate of around 2 per cent for medium and 8 per cent for upper farm households. The medium and upper farm households are found specialising in the production of mustard over the years. Similarly, the analysis depicts that the chilly have been forming an important share in the aggregate quantum of production of spices. In fact, its production has been boosting up to a fairly larger level as compared to remaining spices in each of the farm groups of households.

In terms of the production structure of different fruits is concerned the analysis presented in Table 4.6(e) shows that the size of production of fruits has been consistently increasing across the different categories of farms, though the annual growth achieved in middle farm groups constituted at highest level of 4.69 per cent followed by 4.56 per cent in upper and 3.13 per cent in bottom farm groups during the period 1997 to 2002. During the same period, the growth trend in bottom farms has been indicated fairly highest for litchi (11.17 per cent) followed by 9 per cent

Table: 4.6 : Production Structure Of Different Crops By Size Of Holdings

(Production in Qntrl)

CROPS	Below 1.00				1.00 - 2.00				2.00 And Above				All Groups				Annual Growth During 1997-2002			
	1997		2002		1997		2002		1997		2002		1997		2002		Below 1.00		1.00 - 2.00	
	PROD	%	PROD	%	PROD	%	PROD	%	PROD	%	PROD	%	PROD	%	PROD	%	1997-2002	1997-2002	1997-2002	1997-2002
FOODGRAINS	8236.81	46.57	7479.12	39.22	982.70	18.89	1317.44	20.46	614.06	8.36	784.26	9.83	9833.57	32.49	9580.82	28.61	-1.84	6.81	5.54	
OILSEEDS	335.73	1.90	397.61	2.08	122.14	2.35	114.01	1.77	265.20	3.61	293.25	3.68	723.07	2.39	804.87	2.40	3.69	-1.33	2.12	
SPICES	958.70	5.42	1356.02	7.11	314.25	6.04	401.51	6.24	2.00	0.03	2.00	0.03	1274.95	4.21	1759.53	5.25	8.29	5.55	0.00	
VEGETABLES	3223.94	18.23	4318.17	22.64	578.04	11.11	788.72	12.25	192.24	2.62	273.62	3.43	3994.22	13.20	5380.51	16.07	6.79	7.29	8.47	
FRUITS	2710.28	15.32	3133.84	16.43	906.09	17.41	1118.70	17.37	371.16	5.05	455.76	5.71	3987.53	13.18	4708.30	14.06	3.13	4.69	4.56	
NON-FOOD CROPS	2222.00	12.56	2386.00	12.51	2300.00	44.20	2698.60	41.91	5930.00	80.71	6170.00	77.33	10452.00	34.53	11254.60	33.61	1.48	3.47	0.81	
TOTAL PRODUCTION	17687.46	100.00	19070.76	100.00	5203.22	100.00	6438.98	100.00	7374.66	100.37	7978.89	100.00	30265.34	100.00	33488.63	100.00	1.56	4.75	1.64	

Table 4.6 (a); Production Structure Of Foodgrains By Size Of Holdings

(Production in Qnfl)

CROPS	BELOW 1.00				1.00 - 2.00				2.00 AND ABOVE				ALL GROUPS				ANNUAL GROWTH DURING 1997-2002	
	1997		2002		1997		2002		1997		2002		1997		2002		BELOW 1.00	2.00 & ABOVE
	PROD	%	PROD	%	PROD	%	PROD	%	PROD	%	PROD	%	PROD	%	PROD	%	1997-2002	1997-2002
PADDY	2458.89	29.85	1946.24	26.02	365.30	37.17	389.75	29.58	318.00	51.79	338.00	43.10	3142.19	31.95	2673.99	27.91	-4.17	1.34
MADUA	578.09	7.02	535.36	7.16	36.47	3.71	33.55	2.55	2.08	0.34	1.24	0.16	616.64	6.27	570.15	5.95	-1.48	-8.08
SAWAN	401.72	4.88	346.98	4.64	36.25	3.69	35.55	2.70	2.00	0.33	2.00	0.26	439.97	4.47	384.53	4.01	-2.73	0.00
WHEAT	2603.57	31.61	2271.75	30.37	303.13	30.85	402.47	30.55	245.68	40.01	348.39	44.42	3152.38	32.06	3022.61	31.55	-2.55	8.36
BARLEY	237.05	2.88	115.70	1.55	18.27	1.86	24.96	1.89	1.40	0.23	1.96	0.25	256.72	2.61	142.62	1.49	-10.24	8.00
OTHER CEREALS	945.70	11.48	1034.13	13.83	130.95	13.33	134.29	10.19	24.80	4.04	22.85	2.91	1101.45	11.20	1191.27	12.43	1.87	-1.57
ALL CEREALS	7225.02	87.72	6250.16	83.57	890.37	90.60	1020.57	77.47	593.96	96.73	714.44	91.10	8709.35	88.57	7985.17	83.35	-2.70	4.06
URD	293.21	3.56	283.09	3.79	14.39	1.46	52.05	3.95	11.44	1.86	39.54	5.04	319.04	3.24	374.68	3.91	-0.69	49.13
MASOOR	501.11	6.08	270.12	3.61	17.12	1.74	56.00	4.25	7.08	1.15	22.33	2.85	525.31	5.34	348.45	3.64	-9.22	43.08
PEAS AND GRAM	54.32	0.66	381.51	5.10	37.49	3.81	150.95	11.46	1.28	0.21	6.00	0.77	93.09	0.95	538.46	5.62	120.47	73.75
BHATT/GAHAT AND RAJMA	163.15	1.98	294.24	3.93	23.33	2.37	37.87	2.87	0.30	0.05	1.95	0.25	186.78	1.90	334.06	3.49	16.07	110.00
PULSES	1011.79	12.28	1228.96	16.43	92.33	9.40	296.87	22.53	20.10	3.27	69.82	8.90	1124.22	11.43	1595.65	16.65	4.29	49.47
ALL FOODGRAINS	8236.81	100.00	7479.12	100.00	982.70	100.00	1317.44	100.00	614.06	100.00	784.26	100.00	9833.57	100.00	9580.82	100.00	-1.84	5.54

Table: 4.6 (b) : **Production Structure Of Oilseeds And Spices By Size Of Holdings**
(Production in Qnli)

CROPS	Below 1.00				1.00 - 2.00				2.00 AND ABOVE				All Groups				Annual Growth During 1997-2002			
	1997		2002		1997		2002		1997		2002		1997		2002		Below 1.00		1.00 - 2.00	
	PROD	%	PROD	%	PROD	%	PROD	%	PROD	%	PROD	%	PROD	%	PROD	%	Below 1.00	1.00 - 2.00	1.00 - 2.00	2.00 & Above
MUSTARD	74.48	22.18	69.67	17.52	20.25	16.58	20.45	17.94	21.08	27.93	25.96	43.55	115.81	16.02	116.08	14.42	-1.29	0.20	0.20	4.63
LAHI	2.15	0.64	2.30	0.58	3.20	2.62	2.40	2.11	2.00	2.65	1.75	2.94	7.35	1.02	6.45	0.80	1.40	-5.00	-2.50	-2.50
SOYABEEN	239.62	71.37	305.09	76.73	95.89	78.51	88.06	77.24	52.40	69.42	31.90	53.51	387.91	53.65	425.05	52.81	5.46	-1.63	-7.82	-7.82
OTHER OILSEEDS	19.48	5.80	20.55	5.17	2.80	2.29	3.10	2.72	0.00	0.00	0.00	0.00	22.28	3.08	23.65	2.94	1.10	2.14	0.00	0.00
OILSEEDS	335.73	100.00	397.61	100.00	122.14	100.00	114.01	100.00	75.48	100.00	59.61	100.00	533.35	73.76	571.23	70.97	3.69	-1.33	-4.21	-4.21
GINGER	741.00	77.29	931.75	68.71	250.50	79.71	339.00	84.43	0.00	0.00	0.00	0.00	991.50	77.77	1270.75	69.07	5.15	7.07	0.00	0.00
CHILLIES	163.85	17.09	358.95	26.47	34.50	10.98	49.05	12.22	2.00	100.00	2.00	100.00	200.35	15.71	410.00	22.29	23.81	8.43	0.00	0.00
OTHER SPICES	53.85	5.62	65.32	4.82	29.25	9.31	13.46	3.35	0.00	0.00	0.00	0.00	83.10	6.52	78.78	4.28	4.26	-10.80	0.00	0.00
SPICES	958.70	100.00	1356.02	100.00	314.25	100.00	401.51	100.00	2.00	100.00	2.00	100.00	1274.95	100.00	1759.53	95.64	8.29	5.55	0.00	0.00

Other Spices- Garlic, Tamaric, Corriander

each for peaches and pear with a negative growth of 5.75 per cent for plum. Further, the upper farm households are observed achieving a highest rate of increase in the production of peaches (13.92 per cent) followed by 5.74 per cent in plums while the size of production of apricot and pear has been considerably narrowing down. Specialization of medium farm households has been further strengthening in producing peaches and plums. However, over the years, the universally well known principle fruits such as apple and mango have been losing their contribution in the total production of fruits, while the share of another important fruits, viz. pear and peaches has been gaining in almost the farm groups.

Table: 4.6 (c): **Production Structure Of Fruits By Size Of Holdings**(Production in Qn^{tt})

CROPS	Below 1.00				1.00 - 2.00				2.00 And Above				Annual Growth During 1997-2002		
	1997		2002		1997		2002		1997		2002		BELO W 1.00	1.00 - 2.00	2.00 & ABOVE
	PROD	%	PROD	%	PROD	%	PROD	%	PROD	%	PROD	%	1997-2002	1997-2002	1997-2002
MANGO	231.90	8.56	276.53	8.82	67.10	7.41	61.58	5.50	136.20	36.70	144.75	31.76	3.85	-1.65	1.26
PEACH	571.48	21.09	838.25	26.75	291.23	32.14	418.23	37.39	72.00	19.40	122.13	26.80	9.34	8.72	13.93
APPLE	915.11	33.76	972.28	31.03	299.76	33.08	287.21	25.67	37.08	9.99	46.37	10.17	1.25	-0.84	5.01
APRICOT	184.58	6.81	265.38	8.47	68.75	7.59	82.37	7.36	15.93	4.29	11.03	2.42	8.76	3.96	-6.15
PEAR	154.70	5.71	225.56	7.20	25.10	2.77	31.80	2.84	4.50	1.21	4.20	0.92	9.16	5.34	-1.33
PLUM	487.12	17.97	347.15	11.08	129.66	14.31	193.44	17.29	37.35	10.06	48.08	10.55	-5.75	9.84	5.75
LEETCHI	72.98	2.69	113.73	3.63	10.50	1.16	12.30	1.10	63.60	17.14	74.40	16.32	11.17	3.43	3.40
OTHER FRUITS	92.41	3.41	94.96	3.03	13.99	1.54	31.77	2.84	4.50	1.21	4.80	1.05	0.55	25.42	1.33
FRUITS	2710.28	100.00	3133.84	100.00	906.09	100.00	1118.70	100.00	371.16	100.00	455.76	100.00	3.13	4.69	4.56

Other Fruits- Oranges, Lemon, Nuts, Walnut

As far as the emerging structure of production of different vegetables is concerned the analysis indicates that the size of aggregate production of vegetables has been increasing at almost the similar levels across the various farm groups. Since the annual growth rate varied highest from 8 per cent for upper farm groups to lowest at 9 per cent each for bottom and medium farm groups between 1997 to 2002. In fact, the size of production of all major vegetables has been significantly increasing in case of every farm groups. Exception is case of vegetables grown in rainy season which production has shown a declining trend of around 4 per cent in bottom farm groups as against a very high growth of 22 per cent in medium and 10 per cent in upper farm groups. Thus, the overall analysis reveals that growing of rainy seasonal vegetables, including of the tomato has been indicated receiving an increasing importance over the years in upper and medium farm groups while the farmers possessing tiny size of holdings of below 1.0 hectare have been providing increasing attention on growing of onion and potato as the growth trend in the production of concerned vegetables accounted for 12.32 per cent and 8.13 per cent respectively in the respective

farm groups. In fact the share of both onion and potato in the gross production of all vegetable together has also been increasing to a significant level in bottom farm groups as against a declining trend revealed for onion in both medium and upper farm groups and for potato in the medium farm group.

PRODUCTIVITY

The attempts on analysing emerging situation and trend of growth in productivity are considered fairly more important indicators of development than to analyse the growth structure in area and production. In this context we proceed to examine the extent to which the productivity structure of various food and non-food crops have been changing across the different geographical locations and among different farm size continuum and at the State level during different periods. Such analysis is expected would provide an inside to understand clearly about the extent of benefit to which different farm size groups of farmers have been deriving in various areas as a result of initiatives they have been undertaking in changing cropping pattern the recent past.

Table: 4.6 (d): **Production Structure Of Vegetables By Size Of Holdings**

(Production in Qntl)

CROPS	BELOW 1.00				1.00 - 2.00				2.00 AND ABOVE				ANNUAL GROWTH DURING 1997-2002		
	1997		2002		1997		2002		1997		2002		BELO 1.00	1.00 - 2.00	2.00 & ABOVE
	PROD	%	PROD	%	PROD	%	PROD	%	PROD	%	PROD	%	1997-2002	1997-2002	1997-2002
POTATO	1998.74	62.00	2811.58	65.11	390.81	67.61	529.72	67.16	120.24	62.55	183.03	66.89	8.13	7.11	10.44
ONION	389.90	12.09	630.14	14.59	62.64	10.84	82.07	10.41	52.80	27.47	61.05	22.31	12.32	6.20	3.13
TOMATO	61.91	1.92	87.59	2.03	3.60	0.62	6.60	0.84	9.00	4.68	14.85	5.43	8.30	16.67	13.00
CABBAGE	281.57	8.73	383.51	8.88	90.90	15.73	107.58	13.64	3.90	2.03	5.28	1.93	7.24	3.67	7.08
OTHER VEGETABLES	491.84	15.26	405.35	9.39	30.09	5.21	62.75	7.96	6.30	3.28	9.41	3.44	-3.52	21.71	9.87
VEGETABLES	3223.96	100.00	4318.17	100.00	578.04	100.00	788.72	100.00	192.24	100.00	273.62	100.00	6.79	7.29	8.47

(i) **State Level:** Emerging situation of per hectare productivity for different food and non-food crops at the State level has been presented in Table 4.7. The analysis reflects that despite a considerable declining trend revealed in the area under different crops the productivity levels of major food and non-food crops have been remarkably increasing in the State, at least after the period 1992-93. Per hectare productivity of all crops together has increased from 62.70 quintals in 1987-90 to 69.40 quintals in 1997-2000, showing an annual increase of 2.22 per cent. A notable picture has further been appeared emerging in the sense that despite a significant declining trends postulated in both area and size of production of foodgrains the productivity of foodgrains has shown a positive growth rate of 0.31 per cent per annum during 1992-95 to 1997-2000, though the

respective growth trend has been noted relatively at much lower order as compared to what it was during the earlier period of 1987-90 to 1992-95. Consistent improvements as revealed in the productivity rates for both vegetables and fruits are the indications that the farming communities have been well aware about to maximise per hectare return from their tiny and marginal farms. Only exception is the case of oilseeds which per hectare productivity trend has been narrowed down from 1.25 per cent in 1992-95 to 0.22 per cent in 1997-2000; this reduced trend might have happened largely due to decreasing interest of farmers in providing sufficient interest in enhancing the production of soyabean, due to a considerable decline in its market value and demands during the recent past.

A look at the growth performance of individual cereals revealed that the productivity of almost the cereals, excepting the case of barley are seen significantly increased till the period 1992-95 but during next period of 1992-95 to 1997-2000 it declined considerably for various major crops such as paddy, madua, barley and pulses. In fact the overall growth trend of all foodgrains together also reduced from 1.83 per cent during 1987-90 and 1992-95 to 0.31 per cent during 1992-95 and 1997-2000. But, despite a considerable decrease in area and resulting achieved a

Table:4.7: **Productivity Of Major Crops At The State Level**

(Productivity in Qntrs/Hect)

	1987-90	1992-95	1997-2000	COMPOUND GROWTH RATE	
				1987-90 to 1992-95	1992-95 to 1997-2000
CROPS	PRODUCTIVITY	PRODUCTIVITY	PRODUCTIVITY	PRODUCTIVITY	PRODUCTIVITY
FOODGRAINS	15.54	17.01	17.27	1.83	0.31
OILSEEDS	9.86	10.49	10.61	1.25	0.22
VEGETABLES	45.95	47.92	55.40	0.84	2.95
FRUITS	23.31	25.58	28.36	1.88	2.08
NON-FOOD CROPS	606.27	571.72	596.53	-1.17	0.85
ALL CROPS	62.70	61.86	69.04	-0.27	2.22

Source: 1) Agricultural Statistics of U.P for respective years, Krishi Bhavan, Lucknow

2) Statistical Abstracts for respective years, Economics and Statistics Department, Lucknow

sizeable negative growth trend revealed in the production of wheat during the recent past the productivity of concerned crop has been still on the path of increasing rate of 1.34 per cent, though it has marginally declined during the period 1992-95 and 1997-2000 as compared to what it had during 1987-90 and 1992-95. The most peculiar trend which emerging is that despite a significant level of declining rate revealed in the productivity of madua over the years the farmers have been increasingly diverting land under the production of concerned crop. Contrary to this, a very low productivity rates as being derived in case of barley has motivated to the farmers in favour of bringing reduction in the area under concerned crop.

Table 4.7(a): **Productivity Of Major Foodgrains At The State Level**

(Productivity in Qntls/Hect)

CROPS	1987-90	1992-95	1997-2000	COMPOUND GROWTH RATE	
				1987-90 to 1992-95	1992-95 to 1997-2000
	PRODUCTIVITY	PRODUCTIVITY	PRODUCTIVITY	PRODUCTIVITY	PRODUCTIVITY
RICE	18.81	19.90	19.62	1.14	-0.28
MADUA	11.23	13.95	13.46	4.43	-0.71
SAWAN	9.94	11.73	12.7	3.37	1.6
WHEAT	16.65	18.18	19.43	1.77	1.34
BARLEY	18.14	15.91	10.82	-2.58	-7.43
OTHER_CEREALS	11.79	12.60	12.69	1.34	0.14
ALL CEREALS	15.83	17.40	17.65	1.91	0.3
ALL PULSES	6.67	6.73	6.58	0.17	-0.46
ALL FOODGRAINS	15.54	17.01	17.27	1.83	0.31

Source: 1) Agricultural Statistics of U.P for respective years, Krishi Bhavan, Lucknow

2) Statistical Abstracts for respective years, Economics and Statistics Department, Lko.

Considering the analysis carried out through incorporating our sample data we also found almost a similar trend has been emerging in the changing characteristics of productivity of various food and non-food crops as revealed through incorporating the secondary data. In all, it reveals that the farmers have been devoting more attention and care in enhancing the productivity of high value crops such as fruits, vegetables, spices, oilseeds and even of pulses rather than to concentrate on the production of relatively low valued traditional food crops over the years so as to achieve maximum per hectare income from their available piece of arable lands. Between the period 1997 and 2002, the annual decrease in the productivity has been noted to a fairly larger level of 7.14 per cent for madua followed by 5.63 per cent for barley 2.81 per cent for paddy and 1.87 per cent of sawan with an aggregate decline of 0.43 per cent for all cereals. A high rate of positive changes in the productivity rates have been occurred in favour of pulses (9.58 per cent) followed by oilseeds (5.68 per cent) during the same period. Among the remaining high value crops, a remarkable positive trend have been visualised for spices which productively structure is as higher as 97.03 quintals per hectare with its annual growth of about 3 per cent. Similarly per hectare productivity of both fruits and vegetables has been growing at the rate of around 2 per cent points.

Table:4.8: EMERGING PRODUCTIVITY BASED ON SAMPLE DATA

CROPS	1997	2002	(Productivity in Qntls/Hect)
	PRODUCTIVITY	PRODUCTIVITY	ANNUAL GROWTH 1997 TO 2002
PADDY	18.23	15.67	-2.81
MANDUA	24.74	15.91	-7.14
SAWAN	26.91	24.40	-1.87
WHEAT	18.46	19.32	0.94
BARLEY	14.04	10.09	-5.63
OTHER CEREALS	26.33	50.41	18.29
ALL CEREALS	19.59	19.17	-0.43
PULSES	13.30	19.67	9.58
ALL FOODGRAINS	18.59	19.25	0.72
OILSEEDS	23.00	29.53	5.68
SPICES	97.03	111.29	2.94
FRUITS	50.44	54.84	1.75
VEGETABLES	46.89	51.38	1.92
NON-FOOD CROPS	457.22	587.40	5.69
ALL CROPS	39.78	44.63	2.44

Economic and Statistics Department, Lko.

In this manner, it may be pointed out that the State of Uttaranchal is possessing more advantages for growing various non-food crops rather than to grow certain food crops, especially traditional cereals. In regards to optimizing the use of available land between the options of growing of various high value non-food crops is concerned it could be pointed out that a fairly larger advantages seems for opting to utilize available and additional land area under the production of spices followed by fruits, off-season vegetables and least for oilseeds in the State.

(ii) **Across the Regions:** Further, considering into account the structure of per hectare productivity of various food and non-food crops grown in different geographical locations, it reveals that excepting the case of foodgrains and vegetables in middle hills the productivity of all the crops has been significantly increasing in each of the areas, though this trend has been varying between the range of 3.87 per cent in high hills to 1.94 per cent in middle hills. The per hectare productivity levels of all crops together are found significantly highest at 62 quintals in low hills followed by 40 quintals in high and lowest at 27 quintal sin middle hills. Excepting the case of oilseeds and non-food crops such as sugarcane and tobacco, the productivity per hectare for remaining high value crops constitutes fairly at a large level in high hill areas as compared to middle and low hill areas.

The high hill areas have the largest advantages in growing spices followed by vegetables and fruits and least for growing oilseeds.

While the low hill areas are seen in advantage position over the middle and high hill areas for growing oilseeds and other non-food crops such as sugarcane, turmeric and tobacco. In middle hill areas the most favourable advantages are in opting for growing spices followed by vegetables, fruits and oilseeds. In spite of the fact that the high hill areas have greater advantages over the middle and low hill areas in terms of using available land under the production of various high value and market oriented crops the productivity of almost the crops, especially for spices and fruits has been increasing to a larger level in former areas as compared to latter areas.

Table: 4.8 (a): **Productivity Of Different Crops By Geographical Locations**
(Productivity in Qnrls/Hect)

CROPS	High Hills		Middle Hills		Low Hills		Annual Growth During 1997-2002		
	1997	2002	1997	2002	1997	2002	High Hills	Middle Hills	Low Hills
	Productivity	Productivity	Productivity	Productivity	Productivity	Productivity	1997-2002	1997-2002	1997-2002
ALL FOODGRAINS	21.20	22.93	14.62	13.81	20.00	21.03	1.63	-1.11	1.03
OILSEEDS	13.45	15.79	15.36	26.56	31.01	36.20	3.47	14.58	3.34
SPICES	71.89	197.95	100.89	105.91	49.48	94.25	35.07	1.00	18.10
FRUITS	51.58	56.26	38.65	44.54	47.55	50.23	1.81	3.05	1.13
VEGETABLES	46.38	59.34	51.00	47.57	41.44	41.91	5.59	-1.35	0.23
NON-FOOD CROPS	0.00	90.00	0.00	0.00	457.22	588.44	0.00	0.00	5.74
TOTAL PRODUCTION	33.55	40.04	24.19	26.53	56.17	61.73	3.87	1.94	1.98

Source 1) Agricultural Statistics of U.P. for respective years, Krishi Bhawan, Lucknow

2) Statistical abstracts for respective years

A look into the productivity levels of individual cereal highlights that the productivity of major cereals such as wheat and rice stands fairly at highest level in low hill areas followed by middle and high hill areas. In this sense the use of available land under the production of concerned cereal would be rather feasible in low hill areas, even the growing of wheat would also be a viable alternative in both high and middle hills. But the land in high areas has been providing better options for growing certain millets such as madua and sawan as compared to staple cereals. Since the productivity of paddy, wheat and barley has been consistently decreasing in high hills. In such a situation the emphasis on shifting of land from the production of rice and wheat into the production of madua and sawan seems to more important option. Also, in middle hills the shift in area from paddy and sawan to the production of wheat would also be a rather suggestive option. The low hill areas have been better endowed with the facility of irrigation and the land is more

fertile than in middle and high hill areas. As a result the per hectare productivity of most cereals, especially wheat and paddy in former area constitutes much higher than in latter areas.

Table. 4.8 (b): **Productivity Of Foodgrains In Different Geographical Locations**
(Productivity In Qntrs/Hect)

CROPS	High Hills		Middle Hills		Low Hills		Annual Growth During 1997-2002		
	1997	2002	1997	2002	1997	2002	High Hills	Middle Hills	Low Hills
	Productivity	Productivity	Productivity	Productivity	Productivity	Productivity	1997-2002	1997-2002	1997-2002
PADDY	9.73	8.31	14.51	10.59	22.90	20.50	-2.92	-5.40	-2.10
MADUA	24.92	27.45	7.17	7.18	7.19	6.54	2.03	0.02	-1.82
SAWAN	35.47	31.70	19.70	14.19	17.22	18.27	-2.13	-5.60	1.22
WHEAT	20.26	15.59	16.21	16.33	19.17	21.97	-4.61	0.14	2.92
BARLEY	15.24	4.14	14.05	8.31	11.67	22.54	-14.56	-8.17	18.63
OTHER CEREALS	60.06	62.14	20.39	33.86	28.60	39.03	0.69	13.21	7.29
ALL CEREALS	24.04	22.35	14.79	13.43	20.47	21.13	-1.41	-1.85	0.64
URD	8.36	10.44	17.20	17.09	11.45	16.20	4.97	-0.13	8.31
MASOOR	8.89	7.97	13.87	9.79	19.72	16.21	-2.07	-5.88	-3.56
PEAS AND GRAM	4.86	36.72	7.44	29.41	11.84	42.61	131.14	59.08	51.98
RAJMA AND BHATT/GAHAT	15.91	44.31	12.22	14.77	67.23	16.36	35.69	4.18	-15.13
PULSES	9.39	25.27	13.92	15.22	16.24	20.21	33.84	1.86	4.88
TOTAL FOODGRAINS	21.20	22.93	14.62	13.81	20.00	21.03	1.63	-1.11	1.03

Considering these facts in mind and in a situation of increasing food insecurity in the State, mainly in middle and high hill areas, bringing additional land areas under the production of wheat and paddy through making shifts from non-viable cereals in low hill areas would be a rather important options while undergoing into the process of crop diversification in different areas. Further considering into account the productivity levels of various pulses across the regional levels the analysis depicts that growing local variety pulses in high hills and urd, masoor, peas and gram in low hills and peas and gram in middle hills could be given increasing weightage as the respective areas are noted possessing better advantages for maintaining the highest level of productivity of the concerned pulses.

There seem differential advantages in growing various oilseeds and spices in favour of different areas in the State. The low hill areas are in better position to achieve relatively better productivity per hectare in case of growing mustard while such advantages of growing for mustered are not available in middle and high hill areas. The available soil and related conditions in high hill

area are largely favouring for using available land in the production of chilly and some local varieties of oilseeds while the middle hill areas have greater options and advantages over the high hill and low hill areas in terms of growing different varieties of oilseeds such as soybeans, lahi, etc. and spices such as ginger and various local types of pulses. The most important features which are appearing from Table 4.8(c) are also that the productivity per hectare of land of almost the oilseeds and spices, expecting, some local oilseeds in mid-hills, has been growing to a much appreciable manner in each of the geographical locations. Though the productivity of oilseeds has been growing at highest level of 15 per cent in middle hills followed by little over 3 per cent each in high and low hill areas. But the growth trends in the productivity level of spices have been achieving more largely in high hills (35 per cent) as compared to low (18 per cent) and middle hills (1 per cent).

In regards to the structure of per hectare productivity levels of various fruits grown in different areas of the State is concerned the analysis undertaken in previous part has already postulated the fact that the various locations in the

Table: 4.8 (c): **Productivity Of Oilseeds And Spices In Different Locations**

(Productivity in Qntls/Hect)

CROPS	High Hills		Middle Hills		Low Hills		Annual Growth During 1997-2002		
	1997	2002	1997	2002	1997	2002	High Hills	Middle Hills	Low Hills
	Productivity	Productivity	Productivity	Productivity	Productivity	Productivity	1997-2002	1997-2002	1997-2002
MUSTARD	0.00	0.00	9.46	10.21	41.15	50.85	0.00	1.59	4.71
LAHI	0.00	0.00	11.30	11.63	10.63	11.25	0.00	0.58	1.18
SOYABEEN	13.43	15.76	18.04	33.45	24.47	24.17	3.47	17.08	-0.24
OTHER OILSEEDS	20.00	22.50	22.25	18.33	18.61	18.10	2.50	-3.52	-0.55
OILSEEDS	13.45	15.79	15.36	26.56	31.01	36.20	3.47	14.58	3.34
GINGER	0.00	0.00	107.77	111.86	0.00	0.00	0.00	0.76	0.00
CHILLIES	71.89	197.95	68.14	80.98	46.43	118.89	35.07	3.77	31.21
OTHER SPICES	0.00	0.00	84.13	77.42	41.35	40.44	0.00	-1.60	-0.44
SPICES	71.89	197.95	100.89	105.91	49.48	94.25	35.07	1.00	18.10

sample areas are possessing greater opportunities and the differential locational advantages favouring for undergoing into production of different non-food crops, especially for fruits rather than for the production of foodgrains so as to achieve maximum per hectare productivity and earnings.

Table. 4.8 (d): **Productivity Of Fruits In Different Locations**

(Productivity in Qntrs/Hect)

CROPS	HIGH HILLS		MIDDLE HILLS		LOW HILLS		Annual Growth During 1997-2002		
	1997	2002	1997	2002	1997	2002	High Hills	Middle Hills	Low Hills
	Productivity	Productivity	Productivity	Productivity	Productivity	Productivity	1997- 2002	1997- 2002	1997- 2002
MANGO	0.00	0.00	23.55	29.56	53.70	54.25	0.00	5.11	0.20
PEACH	50.81	59.33	65.00	85.00	0.00	0.00	3.36	6.15	0.00
APPLE	48.23	54.68	54.00	62.63	0.00	0.00	2.68	3.19	0.00
APRICOT	48.17	66.12	45.19	50.00	0.00	0.00	7.46	2.13	0.00
PEAR	38.35	53.84	36.33	45.41	0.00	0.00	8.08	4.99	0.00
PLUM	71.06	53.81	55.36	63.45	0.00	0.00	-4.85	2.92	0.00
LEETCHI	0.00	0.00	94.30	192.33	32.01	35.19	0.00	20.79	1.99
OTHER FRUITS	56.13	64.81	35.99	24.39	70.28	99.44	3.10	-6.45	8.30
FRUITS	51.58	56.26	38.65	44.54	47.55	50.23	1.81	3.05	1.13

Further, analysing the productivity structure of individual fruits we find a larger of variations are reflecting in this regard across the different geographical locations. It has been noted that the local conditions such as soil characteristics, temperature various infrastructural facilities and certain supporting elements to enhancing productivity per hectare land available in high hill areas have been highly favourable for growing apricot followed by peaches, apple and plums. Also similar advantages for growing these all fruits are also well available in middle hills but the same are not available in the low hill areas. The low hill areas have been specializing in growing mango and litchi as similar to middle hill areas. Increasing initiatives are necessary to promote and strengthening land area under the production of apricot and pear in high hills and peach, apple, litchi and plum in middle hills and mango in low hills in the sense that the productivity levels of concerned identified fruits are indicated to be fairly highly favouring as compared to remaining fruits grown in these respective areas. In addition, the growth trends of concerned fruits have also been by and large picking up increasingly in favour of these areas. Only exception is that the productivity of mango is increasing significantly at larger level in middle hills as compared to lower hills. In all, expecting the case of plum in high hill areas and for other fruits as guava, papaya, etc. in middle hills, the productivity range of remaining fruits has been widening up to a significant level in each of the geographical locations. However, a highest level of increase in the productivity has been revealed in response to litchi (21 per cent) in middle hills followed by 8 per cent each for pear in high hills and other fruits as papaya, guava, etc. in low hills, 7 per cent for apricot in high hills and 6 per cent for peach in middle hills.

Further, comparing the analysis presented in earlier parts in relation to the changing cropping pattern, and production structure and the productivity per hectare land of various vegetables as presented in Table 4.8(e) the important facts which have been fairly emerging are that the farmers in different geographical locations are consistently putting additional land area under the production of those vegetables which are providing relatively higher productivity per hectare land. Similarly it may also be derived the facts that due relatively higher per hectare productivity as being achieved through growing different vegetables as compared in growing foodgrains the farmers have been reducing their land area under the production of foodgrains and shifting it increasing towards the production of vegetables in different areas during the recent past. The high hill areas are indicated to have extremely larger advantages in growing almost the vegetables with a fairly high level of productivity over the remaining middle and low hill areas, though the per hectare productivity of onion is not varying to a larger extent between high and middle hill areas. However, the productivity of tomato has been recorded significantly higher in low hills as compared to middle and high hill areas.

Table: 4.8 (e): **Productivity Of Vegetables In Different Locations**

(Productivity in Qntls/Hect)

CROPS	HIGH HILLS		MIDDLE HILLS		LOW HILLS		ANNUAL GROWTH DURING 1997-2002		
	1997	2002	1997	2002	1997	2002	High Hills	Middle Hills	Low Hills
	Productivity	Productivity	Productivity	Productivity	Productivity	Productivity	1997-2002	1997-2002	1997-2002
POTATO	45.59	59.68	57.28	47.34	38.21	43.70	6.19	-3.47	2.87
ONION	41.04	53.08	44.97	53.02	35.13	38.87	5.87	3.58	2.13
TOMATO	33.06	36.63	34.15	40.17	38.40	42.11	2.16	3.53	1.93
CABBAGE	43.33	49.67	37.48	42.94	33.60	40.25	2.93	2.92	3.96
OTHER VEGETABLES	77.07	87.21	64.06	43.75	65.29	39.31	2.63	-6.34	-7.96
VEGETABLES	46.38	59.34	51.00	47.57	41.44	41.91	5.59	-1.35	0.23

In high hill areas the per hectare productivity stands at highest level of over 87 quintals for local vegetables which are mainly grown during the rainy season followed by around 60 quintals for potato, 53 quintals for onion and 50 quintals for cabbage. It may be noted that almost the vegetables in the high hill areas are grown only during such season when the same cannot be grown elsewhere.

(iii) **Across the Size of Holdings:** Further attempts have been devoted at examining the extent to which the productivity per hectare land for various food and non-food crops have been varying across the different size categories of farms. The overall productivity rates together of food and non-food crops are inversely related with the size of holdings, being highest at 117 quintals for upper to lowest at 36 quintals for bottom farm groups. The most notable picture which has been

emerging through considering this analysis is that the per hectare productivity of almost the non-food crops and foodgrains constitute fairly much larger in bottom farm groups as compared in remaining two groups, only exception is that the productivity of oilseeds has been estimated relatively much higher in favour of upper farm groups than for remaining farm groups. Also, the per hectare productivity of almost the high value non-food crops has been growing significantly in all the farm groups. Though a marginal decreasing trend in the productivity of foodgrains in case of bottom farm groups as against a fairly larger increase in case of medium (9 per cent) and upper (6 per cent) farm groups has been revealed for the period 1997 to 2002. In such circumstance, it is expected that the productivity of foodgrains in bottom farm groups has reached at its highest level and it cannot be strengthened further but there seems to be better chances of increasing the productivity of foodgrains further in medium and upper farm groups.

Moreover, the farmers who owned tiny size of holdings of below 1 hectare are recognized better optimising the per hectare productivity as compared to medium and upper farm holders through exploiting the available area based advantages in using their land under different high value crops. Also the bottom farm groups of farmers have been originating significantly a very high level of per hectare production size in using their lands under the production of spices (17 quintals) followed by 59 quintals and 53 quintals vegetables. Still a considerable extent of opportunities are further persisting for them to enhance the productivity of these high value crops as even in presently emerging situation the productivity of all these crops at their farm level has been significantly increasing.

Table: 4.9 : **Productivity Of Major Crops By Size Of Holdings**

(Productivity in Qntls/Hect)

CROPS	BELOW 1.00		1.00 - 2.00		2.00 & ABOVE		Annual Growth During 1997-2002		
	1997	2002	1997	2002	1997	2002	Below 1.00	1.00 - 2.00	2.00 & Above
	Productivity	Productivity	Productivity	Productivity	Productivity	Productivity	1997- 2002	1997- 2002	1997- 2002
FOODGRAINS	21.20	20.52	9.85	14.08	15.03	19.82	-0.64	8.59	6.38
OILSEEDS	16.54	22.39	15.74	16.48	78.46	113.66	7.07	0.93	8.97
SPICES	100.28	117.40	90.30	96.52	20.00	20.00	3.41	1.38	0.00
VEGETABLES	49.36	52.80	38.69	46.34	38.91	46.22	1.39	3.95	3.75
FRUITS	54.53	58.81	42.50	47.73	46.16	49.97	1.57	2.46	1.65
NON-FOOD CROPS	649.71	697.66	489.36	557.56	402.31	566.06	1.48	2.79	8.14
ALL CROPS	32.95	35.81	34.23	42.94	102.34	117.03	1.74	5.09	2.87

Further the analysis related to the productivity structure of individual cereals and pulses has separately presented in Table 4.9(a). According to concerned analysis the bottom farm groups of

farmers can be categorised as the most perspective farmers as compared to medium and upper farm groups of farmers. Since the farmers with tiny size of holdings are seen originating significantly much higher level of per hectare production in case of almost the cereals as compared to remaining two farm groups of farmers. Also the productivity per hectare of all cereals together accounted relatively higher at 20.41 quintals in favour of former groups of farmers as against 20.34 quintals for upper and 14 quintals for medium farm groups of farmers. The bottom farm groups of farmers are also seen to have exploited the production capacity of their farm at its optimal level. Now the potentials of their land to enhance its productive capacity further seems rather negligible. Hence the productivity of almost the cereals grown in bottom farms has been declining to a certain extent. Such situation has not been visualising in case of medium and upper farm groups. As the per hectare production of all the cereals in both the farm groups has been still increasing at a substantial rates. Further, it revealed that the bottom farm group of farmers have been highly benefiting in deriving a larger per hectare productivity for peas, gram and several local variety of pulses such as bhatt, gahat and rajma. While the per hectare productivity of urd and masoor are being maximised by upper farm holders and the farmers owning medium size of land holdings have been generating much higher per hectare production of peas and gram than the remaining pulses.

Table 9.(A): **Productivity Of Foodgrains By Size Of Holdings**

(Productivity in Qntls/Hect)

CROPS	BELOW 1.00		1.00 - 2.00		2.00 AND ABOVE		ANNUAL GROWTH DURING 1997-2002		
	1997	2002	1997	2002	1997	2002	BELOW 1.00	1.00 - 2.00	2.00 AND ABOVE
	Productivity	Productivity	Productivity	Productivity	Productivity	Productivity	1997-2002	1997-2002	1997-2002
PADDY	19.41	15.70	12.77	13.53	18.60	18.88	-3.82	1.19	0.31
MADUA	17.47	18.49	4.84	5.07	3.85	4.77	1.16	0.96	4.76
SAWAN	30.09	26.94	12.59	12.79	16.67	20.00	-2.09	0.32	4.00
WHEAT	21.12	20.04	9.80	14.57	14.80	22.56	-1.03	9.75	10.49
BARLEY	18.49	12.17	3.53	5.67	5.00	8.91	-6.84	12.17	15.64
OTHER CEREALS	50.68	59.06	23.98	27.29	16.99	19.04	3.31	2.76	2.42
ALL CEREALS	22.03	20.41	11.05	13.58	16.45	20.34	-1.47	4.59	4.73
URD	17.07	16.63	3.13	11.62	4.93	17.19	-0.51	54.28	49.73
MASOOR	18.22	11.73	2.51	9.21	3.37	13.45	-7.12	53.38	59.80
PEAS AND GRAM	6.55	37.37	9.37	34.31	5.82	23.08	94.05	53.21	59.33
BHATT/GAHAT AND RAJMA	21.50	36.83	6.17	10.88	2.50	8.86	14.26	15.26	50.91
PULSES	16.71	21.10	4.81	16.10	4.22	15.73	5.26	46.96	54.48
ALL FOODGRAINS	21.20	20.52	9.85	14.08	15.03	19.82	-0.64	8.59	6.38

Further the analysis presented in terms of extent of benefits being derived in opting for using land under the production of various oilseeds and spices by different categories of the farm holders in Table 4.9 (b) highlights that the per hectare productivity of soyabean and local types of oilseeds consisted fairly larger for bottom groups of farm holders while the upper groups of land holders are in position to derive larger per hectare productivity in case of mustard and lahi. In fact, the medium categories of landholders are also deriving almost similar extent of benefits as accumulated by upper farm holders in case of growing lahi. The most important features which emerging through keeping into account this part of analysis are that the potentials of achieving higher productivity per hectare land in the future for each of the oilseeds, excepting some local oilseeds in each size groups of farms are brightened. These facts are further strongly supported in the sense that the productivity of all the oilseeds across different farm levels has been significantly increasing over the years. Similar conclusions in terms of further development prospects may also be attributed in relation of various spices which are grown by different categories of farm owners. The chilly and ginger are the two dominant spices grown largely in middle and hill areas while the farmers with tiny size of land holding of below one hectare have been found reaping significantly larger extent of advantages as compared to relatively higher farm holders in terms of achieving higher per hectare productivity of both the types of spices.

Table 9(b) : **Productivity Of Oilseeds And Spices By Size Of Holdings**
(Productivity in Qntls/Hect)

CROPS	Below 1.00		1.00 - 2.00		2.00 And Above		Annual Growth During 1997-2002		
	1997	2002	1997	2002	1997	2002	Below 1.00	1.00 - 2.00	2.00 & Above
	Productivity	Productivity	Productivity	Productivity	Productivity	Productivity	1997- 2002	1997- 2002	1997- 2002
MUSTARD	11.25	12.10	10.66	11.11	21.08	23.60	1.50	1.96	2.39
LAHI	9.77	10.45	11.43	12.00	12.50	12.50	1.40	1.84	0.00
SOYABEEN	19.20	28.51	17.82	18.90	23.60	23.81	9.70	1.19	0.17
OTHER OILSEEDS	19.88	19.03	14.00	14.09	0.00	0.00	-0.86	1.44	0.00
OILSEEDS	16.54	22.39	15.74	16.48	22.33	23.10	7.07	1.33	0.69
GINGER	115.78	116.76	89.46	100.30	0.00	0.00	0.17	0.25	0.00
CHILLIES	67.15	129.12	78.41	79.11	20.00	20.00	18.46	0.26	0.00
OTHER SPICES	69.04	71.00	86.03	51.77	0.00	0.00	0.57	0.14	0.00
SPICES	100.28	117.40	90.30	96.52	20.00	20.00	3.41	0.24	0.00

Further, we find that the bottom size of land holders are deriving significantly larger per hectare productivity as a result of growing mango, pear, plum and litchi as compared to remaining farm groups of farmers. While the benefits of growing peaches apricot and apple has been largely going in favour of upper farm holders and the medium farm holders have been achieving highest

per hectare production in case of only other fruits like papaya, guava, etc. as compared to remaining two categories of land holders. It has further been emerged that the farmers with different size of land holding are still possessing an opportunity to boost-up the per hectare production further for almost the fruits. Exception is that the per hectare production of mango in medium and upper farms and for plum in bottom size of farm has shown a declining trend during the recent past, largely due to a very high level of productivity rates that have already been achieved in case of latter groups of fruits in high hills and former types fruits in low hill areas.

Table 4.9(c): **Productivity Of Fruits By Size Of Holdings**

(Productivity in Qntls/Hect)

CROPS	Below 1.00		1.00 - 2.00		2.00 And Above		Annual Growth During 1997-2002		
	1997	2002	1997	2002	1997	2002	BELOW 1.00	1.00 - 2.00	2.00 & ABOVE
	Productivity	Productivity	Productivity	Productivity	Productivity	Productivity	1997-2002	1997-2002	1997-2002
MANGO	57.83	63.86	29.69	25.66	54.48	52.45	2.09	-2.72	-0.75
PEACH	50.04	56.52	48.06	53.48	80.00	81.42	2.59	2.26	0.36
APPLE	50.31	58.12	42.82	44.60	48.79	66.24	3.10	0.83	7.15
APRICOT	47.57	70.39	44.64	52.13	88.50	91.92	9.59	3.36	0.77
PEAR	39.26	56.39	33.92	39.75	32.14	42.00	8.72	3.44	6.13
PLUM	90.71	56.45	43.80	53.44	41.50	42.18	-7.55	4.40	0.33
LEETCHI	68.21	81.82	23.86	30.75	24.84	27.56	3.99	5.77	2.18
OTHER FRUITS	50.77	45.44	43.72	83.61	45.00	48.00	-2.10	18.25	1.33
FRUITS	54.53	58.81	42.50	47.73	46.16	49.97	1.57	2.46	1.65

As far as the productivity trends of various vegetables are concerned the analysis presented in Table 4.9(c) reveals that the overall production per hectare volume of production of vegetable has been increasing to a highest level of 4 per cent for each medium and upper farm holders and a little over 1 per cent points for bottom farm holders. However, reversal is the situation emerging in terms of achieved per hectare productivity so far for vegetables by different categories of farm holders. As the per hectare production of vegetables being derived by bottom farm category of farmers have been estimated around 53 quintals as against little over 46 quintals for each medium and upper farm categories of farmers. As compared to medium and upper farm holders the bottom farm holders are observed deriving fairly larger per hectare production in growing almost the categories of vegetables excepting for tomato which productivity has been recorded at highest level in upper farms. The future perspectives for enhancing per hectare productivity in growing of all

major vegetables, especially, potato, cabbage and onion in medium farms and tomato in bottom farms and rainy seasonal vegetables in upper farm categories seems to be quite favourable.

Thus, based on analysing both secondary and primary data collected from different sample areas in relation to emerging cropping pattern and production structure of various food and non-food crops the important elements which emerging are that irrespective of a very small size of cultivated land available with the farmers in various geographical locations they have been well

Table 9(d): **Productivity Of Vegetables By Size Of Holdings**
(Productivity in Qnltls/Hect)

CROPS	Below 1.00		1.00 - 2.00		2.00 And Above		Annual Growth During 1997-2002		
	1997	2002	1997	2002	1997	2002	BELOW 1.00	1.00 - 2.00	2.00 & ABOVE
	Productivity	Productivity	Productivity	Productivity	Productivity	Productivity	1997-2002	1997-2002	1997-2002
POTATO	48.31	54.98	40.37	47.30	44.87	50.01	2.76	3.43	2.29
ONION	41.13	48.25	43.50	51.29	41.90	47.70	3.46	3.58	2.76
TOMATO	34.39	40.55	25.71	27.50	45.00	49.50	3.58	1.39	2.00
CABBAGE	40.40	45.87	42.88	49.35	21.67	26.40	2.71	3.02	4.37
OTHER VEGETABLES	86.44	57.42	19.54	34.86	10.16	19.60	-6.72	15.68	18.59
VEGETABLES	49.36	52.80	38.69	46.34	38.91	46.22	1.39	3.95	3.75

reaping the area specific advantages and opportunities as provided by the nature through opting for changing cropping pattern according to the given advantages for growing most beneficial and specific crops and thus, to maximise overall per hectare size of production from their land. Significant changes in the farming system have been taking place in different areas in terms of minimising the cultivated land under the traditional and low value crops and its shift into the production of high value and market oriented non-food crops such as fruits, oilseeds, off-season vegetables, spices and sugarcane during the recent past. However, the visualised changes occurring in cropping pattern and the contribution structure of various traditional and non-traditional high value crops in total size of production have been largely varying across the farm size continuum, among different geographical locations and at the State level. A fairly larger increasing trend as revealed in cropping pattern have subsequently resulted a high degree of growth in the gross volume of production in favour of high value crops on the cost of a remarkable decline in the size of foodgrain production in general and traditional crops in particular.

The extent of advantages and opportunities available for opting in the utilisation of land under various high value crops have been largely varying across the different geographical

locations. In all the certain opportunities for opting to undertake the production of various high value crops, especially various fruits, spices and off-season vegetables are largely available in high hill areas and these opportunities start narrow down according to the attitudes and reaches at lowest level in low hill areas. Hence, the farmers in high hill areas have been deriving significantly much higher levels of per hectare productivity in relation to various high value crops as compared to the farmers in middle and low hill areas. In fact, the productivity levels of foodgrains in high hill areas have touched its optimum marks and it has shown a declining trend over the years but such is not in the case of middle and low hill areas where the potentials for bringing further enhancement in productivity of all major food crops including oilseeds are still open to a certain level. The available advantages in maximising per hectare productivity through opting the production of high value and market oriented non-food crops are indicated to have been getting reaped largely by the farmers with tiny size of holdings and this process start declining trend further while moving towards increasing size categories of farms.

CHAPTER V

INCOME AND EMPLOYMENT PERSPECTIVES IN AGRICULTURAL DIVERSIFICATION

It has been well recognised in the preceding chapter that the Uttaranchal State has been gifted various advantages and opportunities by the nature for opting the utilization of available crop land under the production of wide ranging traditional food crops and high value non-food crops. Similarly, the options for initiating agricultural diversification through minimizing the use of land under the traditional low value food crops and its consequent shift into the production of various high value and market oriented non-food crops such as fruits, oilseeds, vegetables and spices are favourably available in its different areas. As the per hectare productivity level of various high value crops have been estimated to many folds higher than the case of food crops in different parts of the State especially in high and middle hills. The advantages and options in favour of initiating agricultural diversification have also been recognized largely in favour of high hill areas followed by middle hill areas through using the available land in producing various fruits, vegetables and spices, while the low hill areas have the options for using available cultivated land in growing of certain cereals, pulses and oilseeds, rather than to concentrate in growing fruits, vegetables and spices on a mass level. Since various fruits which are successfully grown with achieving a very high level of per hectare productivity in high and middle hills can not be grown elsewhere including in low hill areas of Uttaranchal.

Hence, keeping above facts into consideration the increasing gainful employment opportunities and the per household additional income for farming communities in high and middle hill areas can be better achieved through bringing additional land area under the plantation of various high productive fruit trees and growing of local variety spices, off-season vegetables and other non-food crops while the farmers in low hill areas possessing additional advantages for using land under the production of various food crops and oilseeds over the middle and high hill areas by virtue of the availability of developed irrigation facility, fertile lands and several elements supporting to promoting crop productivity could be encouraged to concentrate in growing and promoting the production of various foodgrains and oilseeds.

In continuation of above findings we further proceed to examine in details about the extent to which the differences are prevailing in the structure of per hectare gross income, cost of production, net returns or net income and output-input ratio in using cultivated land under different alternative options as growing of various foodgrains, fruits, vegetables, oilseeds and spices in different geographical locations and across the various farm size continuum. The concerned analysis shall provide a detailed insight into the pattern of income generation from using available land under presently adopted cropping and farming system and the extent to which the emerging rates of incomes can be further maximised through using the same land under different farming options in different areas.

Table 5: **Gross Value Of Output, Cost Of Cultivation And Value Of Net Returns Per Hectare**

(value in Rs)

CROPS	OUTPUT	COST	OUTPUT-INPUT RATIO
FOODGRAINS	9427	1998	4.72
OILSEEDS	17621	3488	5.05
SPICES	93595	36127	2.59
FRUITS	29774	14172	2.60
VEGETABLES	20261	6638	3.05
ALL CROPS	15492	4568	3.39

COST OF PRODUCTION

In the estimation of cost structure involved in the production of different crops the following heads of cost have been taken into consideration:

- (i) Value of seeds and plants (home produced and purchased);
- (ii) Value of fertilizers and manure (home produced and purchased);
- (iii) Value of pesticides and other chemicals;
- (iv) Irrigation charges paid;
- (v) Revenue, taxes and rent of land;
- (vi) Labour charges (wages and cash paid to hired labourers);
- (vii) Cost of land preparation;
- (viii) Harvesting and packaging charges;
- (ix) Transportation charges;
- (x) Cost of hired animals and machinery.

The gross value of per hectare cost in the production of all food and non-food crops together constituted at Rs.4568, consisting highest for growing of spices (Rs.36127) followed by fruits (Rs.11471), vegetables (Rs.6638), oilseeds (Rs.3488) and lowest at Rs.1998 for foodgrains. Thus, the aggregate input cost accounted at around two to six folds high for higher value crops as compared to foodgrain crops. Considering into account the head-wise

cost structure of cultivation as presented in Table 5.1 reveals that the involvement of various inputs such as plants, seeds, fertilizers, hiring of labourers and marketing in the production system occurs a major share of around 75 per cent in the total cost of cultivation. In details, the cost of seeds and plants accounts highest at 26.16 per cent, followed by fertilizers and manure 21 per cent, harvesting and packaging 18 per cent and hired labourers 10 per cent and lowest at less than one per cent point each for irrigation and land revenue charges in the total cost. Considerable differences in head-wise structure of cost for various crops are also highly prevalent in the sense that the harvesting, packaging and transportation happened to be the major heads of cost for fruits, accounting nearly 65 per cent, and inputs such as seeds, hired labourers, hired animals and fertilizers considered to be the leading heads of cost for all remaining crops among the various cost of cultivation. In fact the share of seeds alone, in the production cost of spices and vegetable accounted as large as 63 per cent and over 50 per cent respectively.

Table 5.1: **Gross Value Of Output, Cost Of Cultivation And Value Of Net Returns Per Hectare In Different Locations**

(in Rs)

	HIGH HILLS			MIDDLE HILLS			LOW HILLS		
CROPS	OUTPUT	COST	OUTPUT INPUT	OUTPUT	COST	NET RETURN	OUTPUT	COST	OUTPUT INPUT
FOODGRAINS	5816	1633	3.56	7301	1457	5844	11294	2564	4.41
OILSEEDS	0	0	0.00	16924	2830	14094	20307	3774	5.38
SPICES	5550	19910	2.79	102785	38429	64356	48475	8625	5.62
FRUITS	30252	12567	2.41	22413	5934	16478	29294	7178	4.08
VEGETABLES	20736	7886	2.63	19992	5721	14271	19760	5651	3.50
ALL CROPS	16004	6095	2.63	16332	4722	11609	13391	3117	4.3

A detail analysis on the cost of cultivation per hectare for individual cereal crops and pulses has been shown in Table 5.1(a). Among the various cereals grown in the State the per hectare cost of cultivation stands highest larger for Sawan (Rs.3809) followed by wheat (Rs.2583) and paddy (Rs.2210) with an average cost of Rs.2188 for all cereals together. The cost of fertilizers and hiring of the animals seems to be the leading heads of costs for every cereal crops and the share of both the heads together in total cost has been ranging highest from over 72 per cent for sawan to lowest at 53 per cent for wheat and 56 per cent for paddy.

Table 5.1(a): Headwise Cost Of Production Per Hectare Of Foodgrains

(value in Rs)

CROPS	Land Preparation and Rent	Seeds/Plants	Hired Labour	Fertilizers/ Manure	Pesticides	Irrigation	Revenue Taxes	Harvesting/ Packaging	Transportation	Hired Animals/ Machinery	TOTAL
PADDY	11	219	395	842	216	19	10	60	35	404	2210
%	0.48	9.89	17.87	38.09	9.75	0.87	0.47	2.72	1.56	18.29	100.00
SAWAN	4	266	221	815	8	0	0	6	0	1489	2809
%	0.14	9.46	7.87	29.01	0.27	0.00	0.00	0.24	0.00	53.01	100.00
MADUA	5	117	41	272	2	0	0	2	0	227	665
%	0.70	17.54	6.15	40.96	0.32	0.00	0.00	0.26	0.00	34.07	100.00
WHEAT	9	490	294	1002	234	19	8	120	34	373	2583
%	0.34	18.99	11.38	38.80	9.07	0.73	0.30	4.64	1.31	14.45	100.00
BARLEY	2	133	65	317	3	0	0	12	0	212	744
%	0.33	17.82	8.77	42.65	0.35	0.00	0.00	1.62	0.00	28.45	100.00
OTHER CEREALS	12	319	241	891	18	0	0	12	3	684	2181
%	0.57	14.64	11.05	40.88	0.83	0.00	0.00	0.57	0.13	31.34	100.00
ALL CEREALS	9	316	300	837	178	15	7	71	27	428	2188
%	0.41	14.47	13.71	38.25	8.13	0.68	0.33	3.24	1.22	19.55	100.00
URD	5	232	210	258	7	0	0	9	8	191	921
%	0.52	25.23	22.79	28.00	0.79	0.00	0.00	1.01	0.88	20.78	100.00
MASOOR	8	194	178	276	16	0	3	7	4	154	839
%	0.93	23.07	21.26	32.94	1.87	0.00	0.33	0.80	0.44	18.38	100.00
RAJMA AND BHATT/GAHAT	18	188	115	322	18	0	0	15	9	178	864
%	2.12	21.78	13.34	37.32	2.06	0.00	0.00	1.75	1.00	20.61	100.00
ALL PULSES	8	254	179	338	20	0	1	20	35	168	1023
%	0.78	24.80	17.49	33.09	2.00	0.02	0.10	1.93	3.38	16.41	100.00
ALL FOODGRAINS	9	306	280	756	152	13	6	63	28	385	1998
%	0.44	15.32	14.03	37.82	7.62	0.63	0.30	3.13	1.42	19.28	100.00

The farmers have to bear relatively higher per hectare production cost for oilseeds as compared to both cereals and foodgrain crops but around ten times less than the per hectare cost of spices. The farmers are noted making over 61 per cent of expenditure alone in hiring labourers and the purchases of manure and fertilizer, even the proportionate share of concerned heads reaches as high as over 76 per cent for lahi followed by 70 per cent for local

oilseeds but it stands lowest at nearly 60 per cent for the production of mustard in the total cost.

Among the different spices, per hectare cost of production ranges between Rs.45 thousand to 13 thousand respectively for growing ginger and chilly. A very high per hectare cost involved in the production of ginger has been witnessed largely due to the result of a very larger amount of Rs.30 thousand per hectare expenditure is required to bear the cost of seeds. In fact the proportionate share of seeds and plants has been estimated as high as around 67 per cent for the production of ginger as against 48 per cent for local spices followed by only 22 per cent for chilly in the total cost of production of concerned spices.

A look into the cost structure involved in the production of various high value the analysis revealed that the plantation of fruits happened to be a second most costlier affairs after the production of spices in the overall farming system of the State. Among different fruits, per hectare cost of production stands significant at highest level of Rs.13.36 thousands for apple closely followed at Rs.11.76 thousand for other fruits such as papaya, guava and banana. Harvesting and packaging together seems to be the major heads of cost of almost the fruits which share is accounted for over 50 per cent in the total cost of production. In fact the proportionate share of concerned heads of costs reaches upto 55 per cent mark for plum followed by 53 per cent for each litchi, apricot, peach though it becomes lowest at 40 per cent for other fruits such as guava, papaya and banana. Transportation and manure/fertilizer has been reported as the second and third most important heads of costs respectively, those share in total cost of production of concerned fruits has been estimated at around 15 per cent and 14 per cent respectively. The share of transportation cost in the total cost of production appears relatively highest for nashpati (24 per cent), followed by apricot (18 per cent), apple (15 per cent), peach (15 per cent) and plum (15 per cent), which are mainly grown in high hill areas and partly in middle hill areas. However, the share of transportation cost for fruits such as litchi and mango which are grown only in low and middle hill areas accounted only 9 per cent and 7 per cent respectively.

Table 5.1(b): **Headwise Cost Of Production Per Hectare of Oilseeds And Spices**
(value in Rs)

CROPS	Land Preparation and Rent	Seeds/Plants	Hired Labour	Fertilizers/ Manure	Pesticides	Irrigation	Revenue Taxes	Harvesting/ Packaging	Transportation	Hired Animals/ Machinery	TOTAL
MUSTARD	2	747	463	1436	44	0	0	2	1	450	3144
%	0.06	23.75	14.73	45.66	1.41	0.00	0.00	0.05	0.02	14.31	100.00
LAHI	0	250	875	1268	0	0	0	0	0	411	2804
%	0.00	8.92	31.22	45.22	0.00	0.00	0.00	0.00	0.00	14.65	100.00
SOYABEEN	29	649	822	1402	70	0	0	42	53	602	3669
%	0.78	17.70	22.42	38.21	1.91	0.00	0.00	1.15	1.44	16.40	100.00
OTHER OILSEEDS	58	622	331	2303	0	0	0	0	0	438	3752
%	1.54	16.59	8.82	61.37	0.00	0.00	0.00	0.00	0.00	11.69	100.00
ALL OILSEEDS	21	671	685	1453	57	0	0	26	33	542	3488
%	0.60	19.23	19.65	41.65	1.64	0.00	0.00	0.76	0.94	15.53	100.00
GINGER	788	29934	1798	5473	863	18	0	2445	3230	360	44909
%	1.75	66.65	4.00	12.19	1.92	0.04	0.00	5.44	7.19	0.80	100.00
CHILLIES	72	2910	1306	3999	720	3	43	1277	1798	899	13027
%	0.56	22.34	10.02	30.69	5.53	0.02	0.33	9.80	13.80	6.90	100.00
OTHER SPICES	0	6589	407	4042	246	0	0	720	1260	335	13599
%	0.00	48.45	2.99	29.73	1.81	0.00	0.00	5.30	9.27	2.46	100.00
ALL SPICES	582	22635	1608	5107	795	13	19	2089	2807	480	36127
%	1.61	62.65	4.45	14.14	2.20	0.04	0.05	5.78	7.77	1.33	100.00

Table 5.1 (c): **Headwise Cost Of Production Per Hectare Of Fruits**

(value in Rs)

CROPS	Land Preparation and Rent	Seeds/Plants	Hired Labour	Fertilizers/ Manure	Pesticides	Irrigation	Revenue Taxes	Harvesting/ Packaging	Transportation	Hired Animals/ Machinery	TOTAL
MANGO	160	30	610	1926	698	10	10	4275	610	0	8329
%	1.92	0.36	7.33	23.12	8.38	0.12	0.12	51.33	7.32	0.00	100.00
PEACH	256	147	945	1101	451	7	0	4733	1354	8	9004
%	2.85	1.63	10.50	12.23	5.01	0.08	0.00	52.57	15.04	0.09	100.00
APPLE	438	211	1387	2032	1156	10	1	6050	2050	33	13367
%	3.28	1.58	10.38	15.20	8.65	0.07	0.01	45.26	15.33	0.24	100.00
APRICOT	137	112	1058	1716	313	0	0	6262	2134	24	11755
%	1.17	0.95	9.00	14.59	2.67	0.00	0.00	53.27	18.15	0.20	100.00
NASHPATI	77	32	427	1242	129	0	0	2408	1374	25	5712
%	1.34	0.56	7.48	21.74	2.25	0.00	0.00	42.16	24.05	0.43	100.00
PLUM	306	257	1505	1023	343	1	0	6337	1725	25	11522
%	2.66	2.23	13.06	8.88	2.98	0.01	0.00	55.00	14.97	0.22	100.00
LEETCHI	10	102	599	702	264	7	7	2421	428	0	4539
%	0.22	2.24	13.20	15.46	5.81	0.15	0.15	53.33	9.44	0.00	100.00
OTHER FRUITS	18	80	372	1155	408	6	0	2239	1194	0	5471
%	0.32	1.47	6.80	21.11	7.45	0.12	0.00	40.92	21.83	0.00	100.00
ALL FRUITS	303	175	1187	1635	691	8	2	5737	1715	19	11471
%	2.64	1.52	10.35	14.26	6.02	0.07	0.01	50.01	14.95	0.16	100.00

Finally dealing with the structure of cost involved in undergoing the production of various off-season vegetables in the State the analysis presented in Table 5.5 highlights that the production of potato becomes relatively much higher costlier as compared to the production of remaining vegetables. Per hectare production cost of potato has been estimated to the tune of Rs.8086 as against little over Rs.4 thousand each for onion, tomato, cabbage, while it stands at lowest level of Rs.3.62 thousand for other vegetables which are mainly grown during the rainy season. The growers of potato, onion and local vegetables have to bear a major cost of production in purchasing the seeds and plants of the respective vegetables. As the proportionate share of seeds and plants accounts over 57 per cent for

potato followed by 42 per cent for local vegetables and for 26 per cent for onion in their total costs of production. The hired labourers and manure and fertilizers has been noted as the most important heads of cost for tomato and cabbage which share is however accounted relatively much higher at 44 per cent in case of tomato as against 34 per cent for cabbage in the aggregate costs of respective vegetables. Also the share of transportation cost of cabbage stand fairly at a highest proportion of over 25 per cent followed by onion (16.27 per cent) and lowest at 8.22 per cent for other vegetables grown during the rainy season.

Table 5.1(d): **Headwise Cost Of Production Per Hectare Of Vegetables**
(value in Rs)

CROPS	Land Preparation and Rent	Seeds/Plants	Hired Labour	Fertilizers/ Manure	Pesticides	Irrigation	Revenue Taxes	Harvesting/ Packaging	Transportation	Hired Animals/ Machinery	TOTAL
POTATO	137	4619	534	923	231	10	17	508	886	222	8086
%	1.70	57.12	6.60	11.41	2.85	0.12	0.21	6.28	10.96	2.74	100.00
ONION	59	1154	414	1133	105	2	11	540	713	250	4382
%	1.35	26.34	9.45	25.85	2.41	0.04	0.24	12.33	16.27	5.71	100.00
TOMATO	80	816	874	880	317	23	3	471	532	264	4260
%	1.88	19.14	20.52	20.66	7.43	0.53	0.08	11.06	12.49	6.21	100.00
CABBAGE	109	820	430	1052	154	5	0	458	1092	196	4317
%	2.54	19.00	9.96	24.36	3.56	0.12	0.00	10.61	25.30	4.54	100.00
OTHER VEGETABLES	32	1536	361	733	112	6	5	299	297	235	3616
%	0.88	42.49	9.99	20.28	3.09	0.15	0.13	8.28	8.22	6.49	100.00
ALL VEGETABLES	112	3329	498	950	195	8	13	488	819	226	6638
%	1.68	50.15	7.51	14.31	2.94	0.12	0.19	7.36	12.34	3.40	100.00

PROFITABILITY CONCERNS IN GROWING DIFFERENT CROPS:

(i) **Sample Areas:** The profitability concerns in terms of opting for undertaking the cultivation in favour of different crops has been examined through analysing per hectare value of gross income, net Returns, structure of cost and input-output proportions for various food and non-food crops in Table 5.2. Gross income and net income per hectare cultivated land area comes around Rs.15,492 and Rs.10,924 respectively. The output-input ratio has been estimated to 3.39 which stands significantly highest for oilseeds 5.05 followed by foodgrains (4.72), vegetables (3.05), fruits (2.60) and lowest at 2.59 for spices. In comparison to the per hectare gross income of Rs.9429 being originated from the cultivation of foodgrains it

fruits (2.60) and lowest at 2.59 for spices. In comparison to the per hectare gross income of Rs.9429 being originated from the cultivation of foodgrains it stands around ten-folds higher in case of spices, three-folds for fruits, two-folds for vegetables and little over one and a half folds for oilseeds. Net Returns per hectare have also been reported fairly at highest level of over Rs.57 thousands for spices followed by Rs.18.30 thousand for fruits, Rs.14.13 thousand for oilseeds, Rs.13.62 thousand for vegetables, as against a very low amount of Rs.6.75 thousand for foodgrains.

Table - 5.2: **Gross Income Cost Of Cultivation And Net Income Per Hectare Of Major Crops**

(value in Rs.)

CROPS	GROSS INCOME	COST OF CULTIVATION	NET INCOME	OUTPUT INPUT
FOODGRAINS	9427	1998	6747	4.72
OILSEEDS	17621	3488	14133	5.05
SPICES	93595	36127	57469	2.59
FRUITS	29774	11471	18303	2.60
VEGETABLES	20261	6638	13623	3.05
ALL CROPS	15492	4568	10461	3.39

The output-input ratios for various cereals are varying between the range of 3.64 and 1.78, though the respective ratio stand relatively much higher in case of pulses as compared to cereals. From the view point of maximizing the economic benefits in using cultivated land under the production of different cereals it may be pointed out through considering the analysis presented in Table 5.2(a) that a highest levels of per hectare income can be derived in undergoing the production of wheat and then paddy and other local cereals. Input cost per hectare for undertaking the production of Sawan has been reported to be fairly much larger at Rs.2.80 thousand as compared to Rs.2.58 thousand for wheat and Rs.2.21 thousand for paddy while it comes only Rs.665 for madua and Rs.744 for barley.

Among the various pulses, per hectare gross income varied lowest at Rs.11.83 thousand for local variety pulses such as bhatt, gahat and rajma to highest at Rs.22.79 thousand for peas and gram. In comparison to per hectare net income level being derived from the cultivation of pulses the per hectare cost structure seems to be at very lower order, ranging from Rs.1691 at the maximum for peas and gram to lowest at Rs.864 for local variety pulses. In fact, the per hectare net Returns have been estimated as high Rs.21.10 thousand for peas and gram followed by Rs.16.68 thousand for urd and Rs.11.57 thousand for masoor and lowest at Rs.10.96 thousand for local pulses such as bhatt, gahat and rajma.

Table 5.2 (a): **Gross Income, Cost Of Cultivation And Net Income Per Hectare Of Foodgrains**

(Value in Rs.)

CROPS	GROSS INCOME	COST OF CULTIVATION	NET INCOME	OUTPUT/ INPUT RATIO
PADDY	7388	2210	5179	3.34
MADUA	1998	665	1333	3.00
SAWAN	5003	2809	2194	1.78
WHEAT	9402	2583	6818	3.64
BARLEY	2411	744	1667	3.24
OTHER CEREALS	6688	2180	4507	3.07
ALL CEREALS	7382	2188	5194	3.37
URD	17600	921	16679	19.10
MASOOR	12404	839	11565	14.78
PEAS AND GRAM	22786	1691	21095	13.47
RAJMA AND BHATT/ GAHAT	11827	864	10963	13.69
PULSES	19925	1023	18902	19.48
ALL FOODGRAINS	9427	1998	6747	4.72

Considering into account the output-input ratio, together of all cereals, spices, oilseeds, pulses and various non-food crops, including the fruits, spices and vegetables, the growing of oilseeds has been recognized as the most economical activity as compared to remaining crops. But, the per hectare net amounts of returns in using land under the production of most of the oilseed crops have been revealed significantly to a much lower order than it depicted for various fruits, spices and pulses. Undertaking the production of oilseeds, such as lahi and soyabean seems to be the most economical affairs in the state in the sense that the output-input ratio of concerned crops are in the order of 5.66 and 5.09 respectively as against of 4.99 for mustard and 4.73 for local oilseeds. Also, per hectare net Returns have been estimated relatively highest at Rs.15.01 thousand for soyabean as against other dominant oilseeds of the state, such as mustard (Rs.12.55 thousand). In fact the net returns for local oilseeds stand relatively larger as compared to both lahi and mustard. However, it has to be noted that in spite of the visualised facts that growing of various oilseeds is becoming more economical for farmers as compared to grow various foodgrains and different high value crops the production of oilseeds cannot be carried-out at mass scale level. Because all the oilseeds can be grown only under the mixed farming systems along with or as inter crop with various food crops, especially with madua during the kharif crop season.

The output-input ratios of various spices are however, noted significantly at lower level as compared to remaining high value crops grown in the sample areas. But, both gross income as well as net Returns per hectare for spices have been estimated remarkably very high as compared to other high value crops. The output-input ratio stands highest at 4.08 points for local spices to lowest at 2.58 points for ginger. In fact the net RETURN per hectare has been recorded as higher at Rs.71.09 thousand for ginger followed by Rs.41.89 thousand for local spices and lowest at Rs.33.93 for chilly. Again the cultivation of various spices cannot be undertaken at large scale level in the sense that undertaking the cultivation of spices requires a very high productive soil, developed irrigation facilities and various infrastructural facility. These all facilities are inadequately available in different areas of the state. At present the spices are mainly grown in valley areas and in irrigated lands of some pockets in high and middle hills.

Table 5.2(b): **Gross Income, Cost Of Cultivation And Net Income Per Hectare Of Oilseeds and Spices**

CROPS	Gross Income	Cost of Cultivation	Net Income	(Value in Rs.)
				Output-Input Ratio
MUSTARD	15689	3144	12545	4.99
LAHI	15857	2804	13054	5.66
SOYABEAN	18676	3669	15006	5.09
OTHERS	17754	3752	14002	4.73
ALL OIL SEEDS	17621	3488	14133	5.05
GINGER	115999	44909	71090	2.58
CHILLIES	46954	13027	33927	3.60
OTHER SPICES	55485	13599	41886	4.08
ALL SPICES	93595	36127	57469	2.59

Further, considering into account the output-input structure of various fruits the analysis revealed that the per hectare input cost comprises lowest at Rs.4.54 thousand for litchi to highest at Rs.13.83 thousand for peach while the growing of mango and apple seems to be highly economic all in nature as compared to remaining fruits. This has emerged with the fact that both gross values of output and net Returns per hectare for mango has been recorded as higher at Rs.30.75 thousand and Rs.22.42 thousand respectively and the corresponding value for apple stated to be Rs.35.07 thousand and Rs.21.71 thousand. Among the remaining fruits the value of net Returns per hectare are ranging highest at Rs.20.86 thousand for litchi, which is grown in middle and low hills, and lowest at Rs.7.69

thousand for which is mainly grown in middle hills and then in high hills. In relation to remaining fruits the net returns per hectare are also quite appreciable if we compare them with the per hectare net RETURN as are being derived from the cultivation of various food-crops. The output-input ratio has been indicated highest at 5.60 points in favour of litchi followed by other fruits as papaya, guava, oranges, etc. (4.16 points), 3.69 points for mango, 2.62 points for apple and lowest at 1.87 points for plum followed by 2.20 points for plum.

Table 5.2(c) **Gross Income, Cost of Cultivation and net Income per Hectare of Fruits**

(Value in Rs.)

Crops	Gross Income	Cost Of Cultivation	Net Income	Output-Input Ratio
MANGO	30751	8329	22422	3.69
PEACH	33620	13852	19788	2.43
APPLE	35072	13367	21705	2.62
APPRCOT	25914	11755	14159	2.20
PEAR	13402	57124	7689	2.35
PLUM	21514	11533	9981	1.87
LITCHI	25404	45394	20864	5.60
OTHER FRUITS	22955	5514	17441	4.16
FRUITS	29774	11466	18308	2.60

A look into the structure of net income per hectare being originated from the cultivation of various vegetables provides an impression that growing of different vegetables especially potato and onion, seems to be quite profitable activity as compared to grow pulses and several other high value oilseeds such as mustard and lahi and fruits such as pear and plum in the state. A highest level of net Returns per hectare have been visualized in response to onion (Rs.17.94 thousand) followed by Rs. 13.02 thousand for potato, Rs.12.58 thousand for cabbage, Rs. 12.37 thousand for other vegetables which are3 grown during the rainy season and lowest at Rs.11.46 for tomato which is grown largely in low hill areas. The input cost of potato has been reported to be a very high level of Rs.8086 as compared to Rs.4382 for onion and Rs. 4317 for cabbage and Rs.3616 for other vegetables. The consequences of a very high per unit cost of production as revealed in case of the cultivation of potato the out-out ratio of concerned vegetable crop accounted only 2.61 points as against 5.09 points for onion, 4.91 points for other vegetables grown during rainy season, 3.91 points for cabbage and 3.69 points for tomato.

More significant facts, which have been largely emerging, are that both potato and onion are the major off-season vegetable grown in almost the areas of the state. Both area and production have been recognised consistantly increasing for both the crops over the years. The analysis presented in 5.2 (d) also depicts that despite a very high level of per hectare operating cost involved in the production of potato the net Returns per hectare as

being derived from growing of potato have been quite larger as compared to remaining vegetables grown in the sample areas.

Table 5.2(d): **Gross Income, Cost Of Cultivation And Net Income Per Hectare Of Vegetables**

(value in Rs)

Crops	Gross Income	Cost of Cultivation	Net Income	Output-Input Ratio
POTATO	21102	8086	13017	2.61
ONION	22321	4382	17939	5.09
TOMATO	15714	4260	11455	3.69
CABBAGE	16894	4317	12577	3.91
OTHER VEGETABLES	15986	3616	12369	4.42
ALL VEGETABLES	20261	6638	13623	3.05

Over and above it has been well proved the facts that the more favorable advantages in the state are available in terms of growing various high value non-food crops with a certain locational differences prevailing in relation to location specific advantages available for using land under the cultivation of certain non-food crops instead of growing traditional food crops. A clear picture that has been emerging in favour of opting the cultivation of high value crops has been well reflecting through examining the extent of differences existing in per hectare net Returns and gross value of income being derived in undertaking the production of various food grains and high value crops. Both gross value of output as well as net Returns per hectare for various high value crops have been estimated many folds higher than the case of good grains.

In spite of above revealed emerging reality the proportion of area to gross cropped areas being used under the production of various traditional food grains in still, many times higher as compared to what it is being used under the cultivation of various high value crops. One of the most important explanations in this context seems to be a very high production cost per hectare involved in opting for growing various high value crops as compared in growing of traditional food grains. The persisting poor economic condition of marginal farmers might be hardly allowing them to opt for initiating shift in their traditional farming system.

(ii) **ACROSS THE REGIONS:** Since it has been well recognized in the preceding part of the analysis that initiating agriculture diversification in the state through bringing additional cultivated land under the production of high value crops as fruits, vegetables, spices and

oilseeds would be a most important option in the emerging situation of very low level of Returns being achieved through using available land under the production of traditional food crops as compared to various non-food crops. The study further proceeded to assess the extent of differences are emerging in per hectare gross income, net Returns and cost of production for various food and non-food crops among different geographical locations. Such analysis is expected world provide an insight into the appropriateness and viability situation in opting to and for initiating the cultivation of high value crops in specific to various geographical locations in the process of undertaking agricultural diversification.

The gross income as well as net returns per hectare of land in the cultivation of food grain crops have been noted relatively at very low level as compared to various non-food crops in each of the geographical locations. The net Returns per hectare for food grains accounted at highest level in low hill areas (Rs.8730) followed by Rs.5844 in middle hill areas and at lowest level of Rs.4183 in high hill areas. Reversal is the situation prevailing in relation to the net Returns per hectare being derived from the cultivation of both fruits and vegetables as the corresponding figures constitute highest for favour of high hill areas and lowest for low hill areas. In comparison to food grains, the per hectare net income being derived from the cultivation of spices accounted as high as 9 folds, followed by four-folds for fruits, three folds for vegetables and 59 per cent for oilseeds in high hill areas. However the extent of differences in the generation of per hectare net income from growing foodgrains and non-food crops have been appearing relatively at low level in middle and low hill areas as compared to in high hill areas. In comparison to the cultivation of foodgrain crops the income being originated from the cultivation of fruits has been registered nearly three folds higher in both the areas and little over double in middle hills while almost two folds favour of vegetables in each case of the locations. On the other, the cost of production in the cultivation of both fruits and vegetables has been reported significantly much larger in high hill areas in comparison to middle and low hill areas, it is mainly due to a very high transport and marketing cost involved in former area than in the latter areas. The cost of production per hectare for oilseeds stand highest at Rs.3973 in high hills followed by Rs.3774 in low hills and lowest at Rs.2870 in middle hills. While the reversal is the situation emerging in the cost of cultivation of spices in case of different areas. Thus, due to relatively higher level of per unit cost involved in the production of various food and non-food crops in a very difficult and inaccessible areas of high hills the net Returns for almost the crops in high hill areas have been recognized relatively higher as compared to both middle and low hill areas. Otherwise the gross income per hectare being originated from the production of all high value crops in high hill areas have been reported fairly at much larger level as compared in both middle and low hill areas. The higher level of advantages in favour of middle and low hill areas over the

high hill areas have been reported in obtaining relatively higher per hectare gross income merely from the cultivation of various foodgrain crops.

Table 5.3: **Gross Income, Cost Of Cultivation And Net Income Per Hectare Of All Crops by Locations**

(value in Rs)

CROPS	High Hills				Middle Hills				Low Hills			
	GROSS INCOME	COST OF CULTIVATION	NET INCOME	OUTPUT/ INPUT RATIO	GROSS INCOME	COST OF CULTIVATION	NET INCOME	OUTPUT/ INPUT RATIO	GROSS INCOME	COST OF CULTIVATION	NET INCOME	OUTPUT/ INPUT RATIO
FOODGRAINS	5816	1633	4183	3.56	7301	1457	5844	5.01	11294	2564	8730	4.41
FRUITS	30252	12567	17686	2.41	22413	5934	16478	3.78	29294	7178	22116	4.08
VEGETABLES	20736	7886	12851	2.63	19992	5721	14271	3.49	19760	5651	14109	3.50
OIL SEEDS	11088	3973	7115	2.79	16924	2830	14094	5.98	20307	3774	16533	5.38
SPICES	55550	19910	35640	2.79	102785	38429	64356	2.67	48475	8625	39850	5.62
ALL CROPS	16004	6095	9909	2.63	16332	4722	11609	3.46	13391	3117	10273	4.30

A look into the pattern of income generation from the cultivation of individual food grain crops as presented in table 5.3(a) revealed that the net income being derived from the cultivation of pulses constituted many folds higher than the cases of cereals. Net returns per hectare for both the principle foodgrains such as paddy and wheat are found substantially higher than the case of remaining food grains. Also the per hectare net income being generated from the cultivation of almost the food grains seems to be fairly at larger level in low hill areas as compared to both middle and high hill areas. Per hectare of generations of higher income from the cultivation of foodgrains in favour of low hill areas as compared to remaining two areas could be attributed due to the fact of the availability of highly productive land fertile and in valley areas of low hills as compared to other areas. In fact, the cost of production per hectare has been indicated to the extent of Rs.2721 in low hill areas as against Rs.1775 in high hill areas and Rs.1635 in middle hill areas.

As far as the pattern of income generation from growing various pulses is concerned the analysis reveals that undergoing the production of peas and grams followed by urd is the most remunerative farming system in each of the geographical locations as the per hectare

net returns of peas and gram have been estimated ranging between Rs.15.60 thousand to Rs.29.43 thousand and for urd the corresponding values ranges between Rs.11.48 thousand and Rs.21.15 thousand in favour of high and low hill areas respectively. In fact the net income per hectare being originated from the cultivation of local variety pulses as bhatt, gahat and rajma is also quite significant ranging highest from Rs.22.67 thousand in low hills areas to lowest at Rs.10.19 thousand in high hill areas followed by Rs.10.80 thousand in middle hill areas. In fact the output input ratio for pulses has been estimated as high as 5.01 points in middle hills followed by 4.41 points in low hills and 3.56 points in high hills.

Table-5.3(a): **Gross Income, Input Cost Of Cultivation And Net Income Per Hectare Of Foodgrains by Locations**

(Value in Rs.)

CROPS	HIGH HILLS				MIDDLE HILLS				LOW HILLS			
	GROSS INCOME	COST OF CULTIVATION	NET INCOME	OUTPUT/ INPUT RATIO	GROSS INCOME	COST OF CULTIVATION	NET INCOME	OUTPUT/ INPUT RATIO	GROSS INCOME	COST OF CULTIVATION	NET INCOME	OUTPUT/ INPUT RATIO
PADDY	4097	1433	2664	2.86	5282	1769	3513	2.99	9466	2672	6795	3.54
MADUA	1687	726	961	2.32	2264	619	1645	3.66	2198	614	1584	3.58
SAWAN	4598	3782	817	1.22	4987	1742	3245	2.86	6053	1632	4422	3.71
WHEAT	6127	2171	3956	2.82	6987	1834	5153	3.81	11613	3099	8514	3.75
BARLEY	1787	723	1064	2.47	2489	665	1824	3.74	3267	912	2355	3.58
OTHER CEREALS	4646	2190	2456	2.12	5911	2131	3780	2.77	12106	2208	9897	5.48
ALL CEREALS	4210	1775	2435	2.37	5498	1635	3863	3.36	10040	2721	7319	3.69
URD	12339	860	11480	0.00	14251	789	13462	0.00	22207	1057	21150	0.00
MASOOR	8712	880	7832	9.90	11629	678	10951	17.15	16493	1031	15461	15.99
PEAS AND GRAM	16974	1371	15604	12.39	24552	1448	23103	16.95	31997	2569	29429	12.46
RAJMA AND BHATT/GAHAT	11237	1046	10190	10.74	11458	658	10800	17.41	24000	1327	22673	18.08
ALL PULSES	12285	1062	11223	11.56	13952	802	13151	17.41	21493	1281	20213	16.78
ALL FOODGRAINS	5816	1633	4183	3.56	7301	1457	5844	5.01	11294	2564	8730	4.41

In relation to various spices grown in sample areas the output-input ratio is accounted for less than three points level in high and middle hill areas as against 5.62 points level in low hill areas. Chilly is only the spice grown in high hill areas where its per hectare returns constitutes significantly much higher as compared in middle and low hill areas. Cultivation of

ginger in middle hill areas and other species such as coriander and turmeric in low hill areas have been indicated as the economically most beneficial options. The out-put input ratios in growing oilseeds varied lowest from 2.79 points in high hill areas to highest at 5.98 points in middle hill areas followed by 5.38 pints in low hill areas. Growing of Soybean has been indicated providing a highest level of per hectare returns in comparison to various oilseeds grown in different areas which net returns per hectare accounted highest at Rs.20.81 thousand in low hill areas to lowest at Rs.6.91 thousand in high hill areas followed by Rs.15.53 thousand in middle hill areas.

Table 5.3(b): **Gross Income, Cost Of Cultivation And Net Income Per Hectare Of Oilseeds And Spices by Locations**

(value in Rs.)

CROPS	High Hills				Middle Hills				Low Hills			
	GROSS INCOME	COST OF CULTIVATION	NET INCOME	OUTPUT/ INPUT RATIO	GROSS INCOME	COST OF CULTIVATION	NET INCOME	OUTPUT/ INPUT RATIO	GROSS INCOME	COST OF CULTIVATION	NET INCOME	OUTPUT/ INPUT RATIO
MUSTARD	0	0	0	0.00	13007	2689	10317	4.84	16642	3306	13336	5.03
LAHI	0	0	0	0.00	15600	2188	13413	7.13	16500	4344	12156	3.80
SOYABEEN	10916	3990	6926	2.74	18480	2950	15530	6.27	25031	4220	20812	5.93
OTHERS	50001	1100	3900	4.55	12500	1233	11267	10.14	17741	4078	13664	4.35
ALL OIL SEEDS	11088	3973	7115	2.79	16924	2830	14094	5.98	20307	3774	16533	5.38
GINGER	0	0	0	0.00	115999	44909	71090	2.58	0	0	0	0.00
CHILLIES	55550	19910	35640	2.79	43589	10355	33233	4.21	42611	9417	33194	4.53
OTHER SPICES	0	0	0	0.00	61580	16979	44601	45.67	40426	5250	35176	7.70
ALL SPICES	55550	19910	35640	2.79	102785	38429	64356	2.67	48475	8625	39850	5.62

Income generation potentials with a very high level of per hectare net returns in growing of various fruits, especially apple in middle and high hill areas and mango in low hill areas as compared to other high value crops, including vegetables in respective areas have been clearly indicated in considering into account the analysis presented in table 5.3 (c). In terms of profitability point of view the net returns per hectare originated from growing apple have been noted highest at Rs.21.65 thousand, followed by Rs.19.82 thousand for peach and lowest at Rs.7.36 thousand for pear in high areas. Even in middle hill areas also, growing of apple in one hectare have been providing a fairly very high level of income of above Rs.38 thousand followed by Rs.26.53 thousand litchi and Rs.18.53 thousand for plum. In low hill areas a highest level of per hectare net returns have been estimated for mango (Rs.23.03 thousand) followed by other fruits as guava, papaya etc. (Rs.26.20 thousand). Thus it clearly shows that per household income of farming communities can be better improved through opting the cultivation of various indicated high profitable fruit crops in specific to different

geographical locations. Net returns per hectare in growing various fruits can be further maximized through reducing the cost of production in cases of packaging and transportation, especially in favour of highly inaccessible areas of middle and high hills. A very high level of input cost involved in undertaking the production of fruits, the output-input ratio has been lower down at 2.41 points in high hill areas as compared to followed by 3.78 points for middle and highest at 4.8 points for highly accessible areas like low hills.

Table-5.3 (c) : **Gross Income, Input Cost Of Cultivation And Net Income Per Hectare Of Fruits by Locations**

(value in Rs)

CROPS	HIGH HILLS				MIDDLE HILLS				LOW HILLS			
	GROSS INCOME	COST OF CULTIVATION	NET INCOME	OUTPUT/ INPUT RATIO	GROSS INCOME	COST OF CULTIVATION	NET INCOME	OUTPUT/ INPUT RATIO	GROSS INCOME	COST OF CULTIVATION	NET INCOME	OUTPUT/ INPUT RATIO
MANGO	0	0	0	0.00	23856	5046	18810	4.73	31874	8848	23026	3.60
PEACH	33538	13718	19821	2.44	66167	59517	6650	1.11	0	0	0	0.00
APPLE	35044	13394	21651	2.62	43463	5450	38013	7.97	0	0	0	0.00
APRICOT	26115	11819	14296	2.21	20000	9861	10139	2.03	0	0	0	0.00
PEAR	13125	5763	7362	2.28	18144	4841	13304	3.75	0	0	0	0.00
PLUM	21468	11574	9894	1.85	26045	7518	18527	3.46	0	0	0	0.00
LEETCHI	0	0	0	0.00	36067	9533	26533	3.78	24722	4220	20502	5.86
OTHER FRUITS	36178	10515	19235	3.44	16233	3359	12874	4.83	26202	5163	21039	5.07
ALL FRUITS	30252	12567	17686	2.41	22413	5934	16478	3.78	29294	7178	22116	4.08

More specifically Input cost per hectare for undertaking the cultivation of fruits have been recorded as higher at Rs.12.57 thousand in high hill areas as against Rs.7.18 thousand in low and Rs.5.93 thousand in middle hill areas.

Again the output-input ratio for growing vegetables has also been appeared significantly at much lower level in high hill areas (2.63 point) as compared to what it is appearing in middle (3.49 points) and low (3.50 points) hill areas. In both, middle and low hill areas the visible very low levels of output-input ratios are the reflection of a very high per hectare production cost involved in growing of potato as compared to remaining vegetables. In fact, the input cost per hectare for growing potato has also been recorded very high in high hill areas (Rs.8.63 thousand) as compared in middle (Rs.7.99 thousand) and low (Rs.6.76 thousand) hill areas but the extend of differences in cost structure between growing of potato and other vegetables stand larger in middle and low hill areas as compared to high hill areas.

In all the locations, opting for undertaking the cultivation of onion seems to be more beneficial as compare to growing other vegetables. As the net Returns per hectare for onion constitutes fairly highest at Rs. 19.18 thousand in middle hills followed by Rs. 15.99 thousand in low hills and Rs. 15.80 thousand in high hills. Growing of potato in high and middle hill areas and remaining vegetables in low hill areas have been noted as the second most profitable options.

Table-5.3(d): **Gross Income, Cost Of Cultivation And Value Of Net Returns Per Hectare Of Vegetables In Different Areas**

Value in Rs.

CROPS	High Hills				Middle Hills				Low Hills			
	GROSS INCOME	COST OF CULTIVATION	NET INCOME	OUTPUT/ INPUT RATIO	GROSS INCOME	COST OF CULTIVATION	NET INCOME	OUTPUT/ INPUT RATIO	GROSS INCOME	COST OF CULTIVATION	NET INCOME	OUTPUT/ INPUT RATIO
POTATO	21841	8625	13216	2.53	20694	7994	12700	2.59	19613	6759	12853	2.90
ONION	21113	5309	15804	3.98	23704	4523	19181	5.24	19906	3916	15990	5.08
TOMATO	14016	8200	5816	1.71	13578	3488	10090	3.89	19974	4142	15832	4.82
CABBAGE	17819	5257	12562	3.39	15927	3315	12612	4.80	16388	4043	12345	4.05
OTHER VEGETABLES	8889	2610	6279	3.41	15698	3532	12166	4.44	20503	4312	16192	11.57
ALL VEGETABLES	20736	7886	12851	2.63	19992	5721	14271	3.49	19760	5651	14109	3.50

(iii) **A CROSS THE SIZE CATEGORIES OF FARMS** : Presentation of per hectare gross income, net income, cost of production and output-input ratio for different food and non-food crops across the various size groups of farms have been carried out in table 5.4. The concerned analysis can present the facts regarding which size categories of farmers have been reaping highest level of benefits in terms of originating incomes from their available farms. In all, per hectare average size of net income being generated from the farming have been estimated fairly at highest level by the bottom size farm holders (Rs.10.60 thousands) followed by medium farm holders (10.54 thousand) and at lowest level of Rs.10.50 thousand by upper farm holders. However, the gross income per hectare has been noted highest at Rs.15.20 thousand for medium size of farm holders followed by Rs.15.12 thousand for tiny farm holders of below one hectare and again at lowest level of 14.90 thousand for upper farm holders. Thus the pattern of deriving per hectare income from opting different farming system of farm households is, by and large, negatively related with their size of land holdings.

In growing of different food grain crops, the pattern of generation of per hectare net income has also again seen inversely related with the size classes of farms, though the concern relationship between the level of income generation and size of holding has been the

outcome of extent of differences existing in the cost of production of food grains across the farm size continuum. For instance, the per hectare gross income as generated from the cultivation of foodgrains for tiny farm holders accounted relatively higher than the case of medium farm holders but due to higher production cost per hectare involved in tiny size of farms as compared to larger size of farms has resulted a relatively larger net income per hectare for latter size of farm holders as compared to former one. Similar pattern of differences has been recognised in cases of originating gross income and net income in undertaking the cultivation of different crops across the different size of farms. Gross income per hectare being originated through the cultivation of vegetables stands highest for medium size of farm holders and lowest for bottom size of farm holders but while analyzing the pattern of net income generation per hectare it stood highest for upper farm holders followed by bottom size of farm holders and lowest for medium size of farm holders.

In all, the bottom size of farm holders have seen deriving significantly a high level of net income per hectare as compared to remaining categories of farm holders in growing of only various fruits. Otherwise the upper size of farm holders are noted originating relatively much higher net income per hectare in growing of remaining food and non-food crops as compared to bottom and medium size categories of farm holders. Net income level per hectare being originated by medium farm holders accounted at highest proportion from the cultivation of spices followed by oilseeds, fruits vegetables and lowest from the cultivation of foodgrains. However, the upper categories of farm holders have been originating highest per hectare income from the cultivation of vegetables and at lowest from the cultivation of spices.

Table-5.4: **Gross Income, Cost Of Cultivation And Net Income Per Hectare Of Major Crops By Size Of Holdings**

(Value in Rs.)

CROPS	BELOW 1.00				1.00-2.00				2.00 +			
	GROSS INCOME	COST OF CULTIVATION	NET INCOME	OUTPUT/ INPUT RATIO	GROSS INCOME	COST OF CULTIVATION	NET INCOME	OUTPUT/ INPUT RATIO	GROSS INCOME	COST OF CULTIVATION	NET INCOME	OUTPUT/ INPUT RATIO
FOODGRAINS	8563	1883	6680	4.55	8500	1698	6802	5.01	11011	3176	7773	3.47
FRUITS	32182	12165	20017	2.65	25505	10737	14768	2.38	26678	9304	17373	2.87
VEGETABLES	20186	6614	13572	3.05	20578	7205	13374	2.86	20382	5348	15034	3.81
OIL SEEDS	17092	3621	13471	4.72	18046	3217	14829	5.61	20120	3297	16824	6.10
SPICES	104347	38844	65503	2.69	81250	29132	52118	2.79	20000	13200	6800	1.52
ALL CROPS	15119	4516	10603	3.35	15204	4662	10541	3.26	14900	4399	10458	3.39

Considering into account the pattern of income generations through the cultivation of various cereals and pulses it revealed that undertaking the production of pulses have been providing significantly higher level of per hectare gross and net incomes as compared to go for the production of cereals to every categories of farm holders, in spite of the fact that the farmers with different size of farms have to bear significantly much higher cost of production in opting for the cultivation of cereals as compared to pulses. Excepting the case of madua, the upper size categories of farmers are seen deriving significantly larger net income per hectare as compared to both bottom and medium farm holders in growing all remaining cereals. Net income per hectare in the cultivation of madua is accorded at highest level of Rs.1341 for bottom size of farm holders followed by Rs.1313 for medium and lowest at Rs.1019 for upper size of farm holders. Input cost per hectare of cultivation of cereals has also been noted highest at Rs.3499 for upper size of farm holders as compared to Rs.2118 for bottom and Rs.1862 for medium size of farm holders. The upper size of farm holders are observed meeting relatively higher per hectare cost on hiring labourers and animals as compared to remaining two size categories of farm holders and such pattern has resulted relatively higher per hectare cost in growing of cereals for former groups of land holders than the latter one.

Significantly much lower level of cost per hectare involved in the production of pulses as compared to cereals has resulted a very high level of output-input ratio in favour of pulses across the different size categories of farms, accounting for highest at 5.01 points for medium groups of farms to lowest at 3.47 points for upper and 4.55 points for bottom groups of farms. The upper size categories of farm holders are noted deriving relatively much large amount of income per hectare as compare to bottom and medium size of farm holders in undertaking the production of almost the pulses. Exception is that the net income per hectare being originated through carrying out the production of local pulses such as bhatt, gahat and rajma is estimated fairly larger at Rs.11,02 thousand for bottom size of farm holders and lowest at Rs.10.68 thousand for upper size farm holders.

The benefit of certain area specific advantages available in favour of growing various oilseeds in different sample areas have also been mainly deriving by upper size of farm holders. As net income per hectare originated by upper farm holders has been estimated to the tune of Rs.16.82 thousand as against Rs.14.83 thousand by medium and Rs.13.47 thousand by bottom farm holders.

Table 5.4 (a): **Gross Income, Cost Of Cultivation And Net Income Per Hectare Of Foodgrains By Size Of Holdings**

(Value in Rs.)

CROPS	BELOW 1.00				1.00-2.00				2.00 +			
	GROSS INCOME	COST OF CULTIVATION	NET INCOME	OUTPUT/ INPUT RATIO	GROSS INCOME	COST OF CULTIVATION	NET INCOME	OUTPUT/ INPUT RATIO	GROSS INCOME	COST OF CULTIVATION	NET INCOME	OUTPUT/ INPUT RATIO
PADDY	7351	2114	5237	3.48	6800	2024	4776	3.36	8594	3169	5425	2.71
MADUA	2039	699	1341	2.92	1835	522	1313	3.52	1600	5424	1019	2.75
SAWAN	5111	3098	2013	1.65	4462	1477	2985	3.02	6000	581	3450	2.35
WHEAT	9417	2452	6964	3.84	8164	2300	5864	3.55	11504	2550	7454	2.84
BARLEY	2343	791	1552	2.96	2478	633	1845	3.91	4018	4050	3073	4.25
OTHER CEREALS	6663	2329	4619	2.86	4951	1572	3383	3.15	14175	945	5425	5.67
ALL CEREALS	7324	2118	5206	3.46	6403	1862	4541	3.44	9976	2500	6477	2.85
URD	17105	947	16158	18.07	18474	751	17723	24.61	19557	3499	18493	18.38
MASOOR	11990	845	11146	14.20	12112	712	11400	17.01	19211	1064	17981	15.62
PEAS AND GRAM	21144	1594	19550	13.26	26624	1900	24723	14.01	22308	1230	20335	11.31
RAJMA AND BHATT/ GAHAT	11893	877	11016	13.55	11690	829	10861	14.10	11591	1973	10677	12.69
PULSES	15077	1010	14066	14.92	17041	1027	16014	16.59	19194	1172	18022	16.38
ALL FOODGRAINS	8563	1883	6680	4.55	8500	1698	6802	5.01	11011	3176	7773	3.47

Also, expect in the case of lahi, the net income being derived from the cultivation of remaining oilseeds accounted significantly much higher in favour of upper farm holders as compare to other size of farm holders; though relatively higher net income per hectare in the cultivation of Soyabeen as compared to other oilseeds have been well recognised in case of almost the size of land holders.

Table- 5.4(b) : **Gross Income, Cost Of Cultivation And Net Income Per Hectare Of Oilseeds And Spices By Size Of Holdings**

(Value in Rs.)

CROPS	BELOW 1.00				1.00-2.00				2.00 +			
	GROSS INCOME	COST OF CULTIVATION	NET INCOME	OUTPUT/ INPUT RATIO	GROSS INCOME	COST OF CULTIVATION	NET INCOME	OUTPUT/ INPUT RATIO	GROSS INCOME	COST OF CULTIVATION	NET INCOME	OUTPUT/ INPUT RATIO
MUSTARD	15643	3335	12307	4.69	15405	2541	12864	6.06	16409	3155	13255	5.20
LAHI	14455	2364	12091	6.12	18000	3150	14850	5.71	15000	3000	12000	5.00
SOYABEEN	17934	3772	14161	4.75	18933	3497	15437	5.41	23701	3444	20257	6.88
OTHERS	17019	3906	13113	4.36	21364	3000	18364	7.12	0	0	0	0.00
ALL OIL SEEDS	17092	3621	13471	4.72	18046	3217	14829	5.61	20120	3297	16824	6.10
GINGER	128202	50035	78167	2.56	87189	32809	54380	2.66	0	0	0	0.00
CHILLIES	46018	12931	33087	3.56	55419	13419	42000	4.13	20000	13200	6800	1.52
OTHER SPICES	61448	15296	46152	4.02	34385	7596	26788	4.53	0	0	0	0.00
ALL SPICES	104347	38844	65503	2.69	81250	29132	52118	2.79	20000	13200	6800	1.52

Also, due to relatively very low level of production cost per hectare involved in the cultivation of various oilseeds, the output-input ratios turned out to be very high ranging highest at 6.10 points for upper size of farm holders to lowest at 4.72 points for bottom size of farm holders. As the consequences of vary low per unit cost involved in the production of oilseeds as compare to the production of spices in sample areas the proportion of net income to the production cost for spices has been registered to a much lower level than the case of oilseeds. But in absolute terms, the net income per hectare in undertaking the production of various spices has been indicated many times higher than the cases of oilseeds. The farmers possessing tiny size of holdings of below one hectare are found deriving fairly much higher income per hectare as compared to medium and upper size of farm holders in growing different spices. In fact the input cost per hectare involved in producing spices has also been negatively related with the size categories of holdings. Using one hectare land under the production of spices has been providing between Rs.65.50 thousand to Rs.52.12 thousands net incomes to the bottom and medium size of farm holders respectively.

Carrying out the production of various fruits also recognised requiring a very larger amounts of finances for meeting out certain expenses beginning from the stages of the plantation of fruit trees to the marketing of final products. Broadly, with the per hectare input cost ranging between Rs.17.37 thousand to Rs.12.17 thousand the farmer can achieve the net output ranging between Rs.20.02 thousand to Rs.14.77 thousand. On the other output-input ratio varies highest from 2.87 points for upper size of farm holders to lowest at Rs.2.38 points for medium size of farm holders. The bottom size of farm holders are seen deriving comparatively higher net income per hectare as compared to remaining size of farm holders in using their land under the production of mango, pear, plum and leetchi while the medium farm holders seem to be deriving highest benefits in the production of fruits such as papaya, guava etc. and upper size of farm holders are seen deriving relatively higher per hectare income in producing peach, apple and apricot. The gross value of output per hectare accounted highest from Rs.52.02 thousand in case of growing litchi to lowest at Rs.13.87 thousand for growing bears in bottom farm groups while in both upper as well as in medium farm groups the highest per hectare gross income is being derived from the production of peaches, and lowest from the production of pears.

Further it revealed that undertaking the production of vegetables seems to be less cost effective as compared to go in favour of the production of fruits for every size of farm holders in sample areas. Though the proportion of output-input ratio for all vegetables together constituted at highest level for upper size of farm holders (3.81 points) followed by 3.05 points for bottom size of farm holders and lowest at 2.86 points for medium size of farm holders.

Table 5.4 (c) : **Gross Income, Cost Of Cultivation And Net Income Per Hectare Of Fruits By Size Of Holdings**

(Value in Rs.)

Crops	BELOW 1.00				1.00-2.00				2.00 +			
	GROSS INCOME	COST OF CULTIVATION	NET INCOME	OUTPUT/INPUT RATIO	GROSS INCOME	COST OF CULTIVATION	NET INCOME	OUTPUT/INPUT RATIO	GROSS INCOME	COST OF CULTIVATION	NET INCOME	OUTPUT/INPUT RATIO
MANGO	39641	10865	28776	3.65	18794	4621	14173	4.07	27201	7575	19626	3.59
PEACH	32787	13498	19289	2.43	31865	13181	18685	2.42	50994	20519	30475	2.49
APPLE	38182	13975	24207	2.73	26026	11416	14610	2.28	43966	16774	27191	2.62
APRICOT	27209	12469	14740	2.18	21999	9572	12427	2.30	36750	18050	18700	2.04
PEAR	13867	5946	7921	2.33	11325	4678	6648	2.42	11400	4660	6740	2.45
PLUM	22618	11625	10993	1.95	21101	11641	9460	1.81	16868	10691	6177	1.58
LITCHI	52017	8537	43479	6.09	17550	5300	12250	3.31	12867	2369	10498	5.43
OTHER FRUITS	23365	6264	17101	3.73	22950	2284	20666	10.05	14400	2130	12270	6.76
ALL FRUITS	32182	12165	20017	2.65	25505	10737	14768	2.38	26678	9304	17373	2.87

Due to A larger overall per unit production cost appeared in the production of various vegetables for the medium size of farm holders the net income per hectare being achieved by them through growing concerned crops revealed lowest at Rs.13.37 thousand as compared to both tiny size of land holders (Rs.13.57 thousand) and upper size of farm holders (Rs.15.03 thousand). Using available land under the production of onion seems to be providing a highest level of net income per hectare as compared to growing other off season vegetable to each size categories of farm holders. Growing of tomato in upper size of farms, cabbage in medium size of farms and rainy seasonal vegetables in bottom size of farms have been recognized as the second most beneficial concern in terms for achieving maximum per hectare income.

Further, an attempt has been carried out to examine the extent to which different size of farm households have been allocating their available land under different options of growing food grains, and various other high value crops and the contribution of these options in total incomes the different size categories of farm households in different areas. The concerned analysis will provide a detailed understanding about the appropriateness of presently land use pattern under different cropping systems and then to highlight the most appropriate and feasible option, which could be helpful in maximizing average income level of different size categories of farm holders in various geographical locations.

Table 5.4 (d): **Gross Value Of Output, Cost Of Cultivation And Net Income Per Hectare Of Vegetables By Size Of Holdings**

(Value in Rs.)

CROPS	BELOW 1.00				1.00-2.00				2.00+			
	GROSS INCOME	COST OF CULTIVATION	NET INCOME	OUTPUT/ INPUT RATIO	GROSS INCOME	COST OF CULTIVATION	NET INCOME	OUTPUT/ INPUT RATIO	GROSS INCOME	COST OF CULTIVATION	NET INCOME	OUTPUT/ INPUT RATIO
POTATO	20923	7969	12953	2.63	21718	9015	12703	2.41	21732	6869	14863	3.16
ONION	21693	4530	17163	4.79	25697	3853	21844	6.67	24516	3534	20982	6.94
TOMATO	15476	4360	11117	3.55	15000	6571	8429	2.28	18000	1690	16310	10.65
CABBAGE	16776	4437	12339	3.78	18014	3900	14114	4.62	9600	3850	5750	2.49
OTHER VEGETABLES	17546	3916	13629	4.48	12783	3004	9779	4.26	5050	1496	3554	3.38
ALL VEGETABLES	20186	6614	13572	3.05	20578	7205	13374	2.86	20382	5348	15034	3.81

The analysis presented in table 5.4 (e) shows that on an average a farm household is in a position to originate around Rs.7921 net income from undertaking farming in sample areas though the respective amount of income per household revealed highest at Rs.8637 in low hill areas, followed by Rs.8028 in middle and Rs.7116 in high hill areas. Further, an

average size of land available per household for cultivation is estimated to 0.75 hectares and the proportion of which is used under the production of traditional foodgrains accounted as high as 68 per cent, comprising to the extent of over 80 per cent in low hill areas followed by 71 per cent. In all providing 68 percent of cropped area under the production of food grains has been contributing the share of only around 44 per cent of income in the total income of farm households in sample areas. On the other, using 32 per cent of cultivated land under the production of various high value crops has been observed providing a share of 56 per cent in the total income of farm households. Also the share of income originated from growing various high value crops to the total incomes of farm households has been noted comparatively highest in high hill areas and lowest in low hill areas. On the other, the share of income generated from the production of food grains has been noted highest at 69 per cent in low hills, 36 per cent in middle hills and lowest at 21 per cent in high hills while the proportion of area to total cropped area used under the production of foodgrains in respective areas constitute in the order of 80 per cent, 71 per cent and 50 per cent in cropped area diverted under the production of traditional food crops, respective areas. The diversion of land under the production of various high value crops, especially fruits have been indicated as a most profitable option in each of the geographical locations, As the share of income being generated from fruits in total income of farm households accounted almost of the share of cultivated land area used under the production of fruits in middle and low hills whereas the respective share of land area and the income accounted for 29.17 per cent and 51.59 per cent in high hill areas.

Table-5.4(e): **Average Area And Income Per Household Under Different Options By Locations**

(Cropped Area in Hects, Income in Rs)

OPTIONS	HIGH HILLS		MIDDLE HILLS		LOW HILLS		ALL AREAS	
	CROPPED AREA	INCOME	CROPPED AREA	INCOME	CROPPED AREA	INCOME	CROPPED AREA	INCOME
FOODGRAINS	0.36	1499	0.49	2862	0.69	5992	0.51	3447
%	50.00	21.07	71.01	35.66	80.23	69.38	68.00	43.52
FRUITS	0.21	3671	0.01	191	0.04	883	0.09	1613
%	29.17	51.59	1.45	2.38	4.65	10.23	12.00	20.37
VEGETABLES	0.14	1741	0.12	1648	0.07	1007	0.11	1465
%	19.44	24.47	17.39	20.53	8.14	11.66	14.67	18.49
OIL SEEDS	0.01	97	0.03	414	0.04	682	0.03	396
%	1.39	1.37	4.35	5.15	4.65	7.89	4.00	4.99
SPICES	0.01	107	0.05	2912	0.01	73	0.02	1000
%	1.39	1.50	7.25	36.28	1.16	0.85	2.67	12.63
ALL CROPS	0.72	7116	0.69	8028	0.69	8637	0.75	7921
%	100.00	100.00	100.00	100.00	80.23	100.00	100.00	100.00

Further, it has been recognised that the proportionate cultivated land under the production of various traditional food crops has been invariably negatively related with the size of holdings. It indicates the facts that the farming households owning relatively lower size of holdings do not have many options open for using their land under the cultivation of many crops especially various high value crops and are more likely focusing on using it under the production of traditional food crops, partly due to the availability of a very limited cultivated land with them and partly the extent of larger risks involved in growing of various high value crops especially through the plantation of fruits from the natural calamities and emerging inaccessibility to marketing network. The proportion of land used under the food grains to total cropped areas is noted as high as over 68 per cent in tiny farms to lowest at 58 per cent in upper size of farm groups. But the average size of land per household used under the food grains stands 0.41 hectares for tiny farmers while it averages as high as over 3 hectare for upper size of land holders.

Table 5.4 (f): **Average Area And Income Per Household Under Different Options By Size Of Holdings**

(Cropped Area in Hects, Income in Rs.)

OPTIONS	BELOW 1.00		1.00 - 2.00		2.00 +	
	CROPPED AREA	INCOME	CROPPED AREA	INCOME	CROPPED AREA	INCOME
FOODGRAINS	0.41	2733	1.20	8161	3.04	23654
%	68.33	43.21	62.50	41.61	58.02	51.33
FRUITS	0.06	1208	0.30	4438	0.70	12188
%	10.00	19.10	15.63	22.63	13.36	26.45
VEGETABLES	0.09	1257	0.22	2918	0.46	6846
%	15.00	19.87	11.46	14.88	8.78	14.86
OIL SEEDS	0.02	271	0.09	1316	0.20	3339
%	3.33	4.28	4.69	6.71	3.82	7.25
SPICES	0.01	857	0.05	2780	0.01	52
%	1.67	13.54	2.60	14.17	0.19	0.11
ALL CROPS	0.60	6326	1.92	19612	5.24	46080
%	100.00	100.00	100.00	100.00	100.00	100.00

Moreover the analysis shows that the proportion of land areas used under the production of various high value crops has been positively related with the size categories of farms. However, the pattern of deriving net income per hectare of land as allotted under the production of main high value crops such as fruits has been negatively related to the size of farms. In all the marginality situations of almost the size categories of farm households has been well reflecting while considering into account the average income per household being originated from undertaking the farming operations in almost the sample areas.

The low hill areas are possessing a very high fertile and productive land and have easy access to various infrastructural facilities and several supporting elements to agricultural productively. Hence the diversification of agriculture in low hill areas may be initiated through enhancing the increasing level of productivity of both foodgrains crops as well as growing of various area specific specialized vegetables such as onion and potato and fruits such as mango and litchi. However, providing increasing concentration on strengthening the cultivation of various specialized food crops in low hill areas would be an important concern in the context of sufficiently meeting the demand of various food grain in middle and high hill areas. On the other, the available level in both high and middle hill should increasingly be shifted towards growing of various high value crops as the lands in both the areas has been recognized relatively more suitable for growing high value crops and compared to traditional foodgrains.

The most striking feature which emerging through assessing the benefit cost analysis between involved opting the cultivation of various traditional food grains and high value crops in various areas is that undergoing the production of latter crops, especially fruits, vegetables and spices has revealed a very costlier cultivation as compared to various traditional food crops. The facts are also clear that due to the involvement of such a fairly higher cost of production involved opting for undertaking the cultivation of various fruits and vegetables the farming communities in most cases have been preferring to undertake the cultivation of traditional food crops rather than to grow various high value crops because the poor economic conditions of most farmers in the state, especially in very inaccessible areas of middle and high hill areas do not allow them to bear such a high cost of production as appearing in growing various high value crops.

PERSPECTIVES IN CREATION OF EMPLOYMENT THROUGH AGRICULTURAL DIVERSIFICATION:

Diversification of agriculture sector has been considered to be the most important instrumental initiative for enhancing the productivity per hectare of various crops, thereby generating increasing level of income for farming households and the creation of additional employment opportunities. It is also a well considered fact that the cultivation of food crops, especially traditional cereals farming system generally provide lower level of income as well as mandays employment per hectare as compared to the cultivation of high value market oriented commercial crops such as fruits, off season vegetables, spices etc. In this context the study further attempts to examine the extent of differences have been emerging in the generation of employment opportunities under various available alternative options as growing of food grains, fruits and vegetables in different geographical locations.

The analysis on the size of workers employed per hectare of land in sample areas is presented in table 5.5. It revealed that undertaking various farming operations in sample areas have been providing employment opportunities to both men and women worker force with a little difference prevailing in their proportions. However the, cultivation of various high value crops seems to be fairly more labour intensive as compare to traditional crops. As the number of workers employed per hectare in growing of food grains accounted only 6 as against 16 and 23 workers in growing of fruits and vegetables respectively. Further the employment creation potentials in different stages of production and marketing of fruits and vegetables accounted for nearly three times and four times higher respectively as compared to the cultivation of foodgrain crops. Also the growing of fruits and vegetables have been proportionately employing both men and women labourforce and their children while the cultivation of food grains is performed by men and women labourforce only.

Table 5.5: **Cropwise Per Hectare Employment**

CROPS	ALL AREAS			
	MEN	WOMEN	CHILD	TOTAL
FOODGRAINS	3	3	0	6
%	50.00	50.00	0.00	100.00
FRUITS	10	5	1	16
%	62.50	31.25	6.25	100.00
VEGETABLES	12	9	1	22
%	54.55	40.91	4.55	100.00
ALL CROPS	5	4	1	10
%	50.00	40.00	10.00	100.00

On an average the cultivation of various crops in one hectare land is providing employment opportunities to 12 workers in high hill areas, 10 workers in middle and 8 workers in low hill areas. In growing of fruits per hectare employment has been recorded highest in favour of middle hill areas (26 workers) followed by 17 workers in low and 14 workers in high hill areas. However, the potential of creating employment opportunities through using cultivated land under the production of off-season vegetables seems to be fairly larger in favour of low hills followed by middle and high hills. But per hectare workers employed in the cultivation of foodgrains stand highest to 8 workers in high hill areas as against 5 workers each in middle and low hill areas. In comprising to cultivation of land under food grains, the proportion of workers per hectare land in growing fruits accounted as high as at over five folds in middle hill areas followed by over three folds in low hill areas and 75 per cent in high hill areas. Similarly, using one-hectare land under the production of vegetables is providing nearly five folds and three folds higher range of employment as compared to

foodgrains in different areas. The proportion of women to total workers employed in growing both vegetables and fruits are noted fairly highest in low hill areas and lowest in high hill areas, though the share of child workers in total workers employed in growing together of vegetables and fruits is registered fairly larger in middle hill areas as compared to high hill areas while none of child worker is employed in low hill areas either in the operation of foodgrains or both vegetables and fruits.

Table 5.5 (a): **Cropwise Per Hectare Employment By Locations**

CROPS	HIGH HILLS				MIDDLE HILLS				LOW HILLS			
	MEN	WOMEN	CHILD	TOTAL	MEN	WOMEN CHILD		TOTAL	MEN	WOMEN	CHILD	TOTAL
FOODGRAINS	4	3	0	7	3	2	0	5	2	3	0	5
%	57.14	42.86	0.00	100.00	60.00	40.00	0.00	100.00	40.00	60.00	0.00	100.00
FRUITS	9	4	1	14	16	8	2	26	12	5	0	17
%	64.29	28.57	7.14	100.00	61.54	30.77	7.69	100.00	70.59	29.41	0.00	100.00
VEGETABLES	11	8	2	21	12	9	2	23	15	11	0	26
%	52.3809524	38.0952	9.524	100.00	52.17	39.13	8.70	100.00	57.69	42.31	0.00	100.00
ALL CROPS	7	4	1	12	5	3	2	10	4	4	0	8
%	58.33	33.33	8.33	100.00	50.00	30.00	20.00	100.00	50.00	50.00	0.00	100.00

Across the different size categories of farms the elasticity of employment generation together in undertaking the operation of food grains and high value crops seems to be significantly higher in bottom size of farms as compared to relatively larger size categories of farms. However, the per hectare employment in food grains production has been noted highest 7 workers in bottom size of farms closely followed by 6 workers in upper farms and lowest to 5 workers in middle size of farms. Further it revealed that elasticity of providing employment in undertaking the farming of both off seasons vegetables and fruits in one hectare of land is fairly much larger in tiny size of farms of below one hectare and it declined constantly according to the increase of the size of farms. Using one hectare cultivated land under the production of vegetables in noted employing to nearly three folds higher workers in growing fruits and nearly four folds in growing of vegetables as compared to food grains in both bottom and medium size of farms as against around two folds in growing of both fruits and vegetables in upper size of farms. The proportion of women workers total workers in undertaking the operation of both fruits as well as off season vegetables has been reported significantly larger in medium size of farms as compared to both bottom and upper size of farms.

Table 5.5 (b) **Cropwise Per Hectare Employment By Size of Holdings**

Crops	Below 1.00				1.00-2.00				2.00+			
	MEN	WOMEN	CHILD	TOTAL	MEN	WOMEN	CHILD	TOTAL	MEN	WOMEN	CHILD	TOTAL
FOODGRAINS	3	3	0	6	2	1	0	3	2	3	0	5
%	50.00	50.00	0.00	100.00	66.67	33.33	0.00	100.00	40.00	60.00	0.00	100.00
FRUITS	13	6	1	20	6	4	1	11	7	3	0	10
%	65.00	30.00	5.00	100.00	54.55	36.36	9.09	100.00	70.00	30.00	0.00	100.00
VEGETABLES	13	11	1	25	9	6	1	16	9	2	0	11
%	52.00	44.00	4.00	100.00	56.25	37.50	6.25	100.00	81.82	18.18	0.00	100.00
ALL CROPS	6	5	1	12	4	2	0	6	4	3	0	7
%	50.00	41.67	8.33	100.00	66.67	33.33	0.00	100.00	57.14	42.86	0.00	100.00

So far the study has examined about the broad situation as emerging in the structure of employment in undertaking the cultivation of foodgrains, fruits and vegetables without considering into account the per day average house of work of workers and the actual number of days a worker was employed during a year increased farming operations. In this context the study has further attempted to full fill the concerned shortcoming through presenting the labour use per hectare in mandays for performing the cultivation of different food grains and non-food grains. On an average, the utilization of one hectare land under the production of food and non-foodgrains together have the potential to provide 310 mandays employment while the employment potentials seems significantly much higher for 566 days under the production of vegetables followed by 475 days for fruits as against only 233 days in opting for food grains production. A very important feature which emerging is that growing of either food grains or various non food crops have been significantly employing to both men as well as women labour force, in fact the proportions of mandays employment per hectare in undergoing the production of foodgrains crop have been recorded fairly higher for women than their men counterpart.

Table 5.5(c): **Cropwise Per Hectare Mandays Employment**

CROPS	ALL AREAS			
	MEN	WOMEN	CHILD	TOTAL
FOODGRAINS	101	132	0	233
%	43.35	56.65	0.00	100.00
FRUITS	343	114	18	475
%	72.21	24.00	3.79	100.00
VEGETABLES	293	260	13	566
%	51.77	45.94	2.30	100.00
ALL CROPS	156	148	6	310
%	50.32	47.74	1.94	100.00

Across the different geographical locations, the potentials of providing employment in terms of per hectare mandays employment in undertaking farming of both food and non-food crops together have been observed relatively higher in high hill areas followed by middle and low hill areas. In comparison to the cultivation of food-grains crops, growing of each fruits and vegetables have been providing almost little over two times higher mandays employment in both high and middle hill areas while 36 per cent in the production of fruits and little over two folds in vegetables in low hill areas. In each of the locations, the use of land under the production of food grains have been providing significantly higher level of mandays employment to women as compared to men. Though, the extent of per hectare use of women as compare to men labourforce in terms of mandays employment together in growing of food grains and non-food crops has been estimated relatively higher in middle and low hill areas while the reversed is the situation emerging in high hill areas.

Table 5.5(d): Cropwise Per Hectare Mandays Employment By Locations

CROPS	HIGH HILLS				MIDDLE HILLS				LOW HILLS			
	MEN	WOMEN	CHILD	TOTAL	MEN	WOMEN	CHILD	TOTAL	MEN	WOMEN	CHILD	TOTAL
FOODGRAINS	111	131	0	242	104	130	0	234	94	434	0	528
%	45.87	54.13	0.00	100.00	44.44	55.56	0.00	100.00	17.80	82.20	0.00	100.00
FRUITS	359	121	22	502	391	161	10	562	242	65	3	310
%	71.51	24.10	4.38	100.00	69.57	28.65	1.78	100.00	78.06	20.97	0.97	100.00
VEGETABLES	285	263	24	572	327	263	9	599	253	250	1	504
%	49.83	45.98	4.20	100.00	54.59	43.91	1.50	100.00	50.20	49.60	0.20	100.00
ALL CROPS	216	153	14	383	146	152	5	303	113	140	1	254
%	56.40	39.95	3.66	100.00	48.18	50.17	1.65	100.00	44.49	55.12	0.39	100.00

A look into the extent of differences existing in the creation of mandays employment between the cultivation foodgrains and certain high value crops according to the size categories of land holdings reveals that mandays employment per hectares land in opting for growing either food crops or various non-food crops are negatively related with the size of holdings. However, extremely a larger variations have been emerging in the potentials of mandays employment creation in opting the use of land under the cultivation of both food and non-food crops among different size categories of farms, though the concerned differences have been narrowing down with the increase of size categories of farms. Per hectare generation of mandays employment in bottom size of farms constitutes only to around 261

days in undertaking the production of foodgrains as compared for 611 days in vegetable growing followed by 555 days in the plantation of fruits. Similarly the use of one hectare land under the production of fruits and vegetable have been respectively generating 91 per cent and 148 per cent higher mandays employment as compared to the mandays employment of 194 being generated in the cultivation of food grain crops. Similarly, in case of upper size categories of farms the use of one hectare cultivated land area under the production of food grains crops has been noticed generating over two and half folds and around 86 per cent less mandays employment in comparison to using similar size of land under the plantation of fruits and vegetables.

Further, the study finds that the cultivation of both food grains and non-food crops have been providing employment to both the sexes, though the average mandays employment per hectare for women are registered lagging far behind to their men counterpart in undertaking the operation of fruit and vegetable cultivation across all the size categories of farms. But in using of cultivated land under the production of food grains crops has been providing significantly higher mandays employment to women as compared to men in almost the size categories of farms, except in upper size of farms. The use of child labour has also been undertaking in the production of both vegetables and fruits in different geographical locations and across different size categories of farms. This trend suggests that cultivation of high value crops require differential categories of manpower to work in their different stages of production, harvesting, packaging and marketing. Secondly greater need of labour and light nature of work on these crops as compared to cultivation of food crops the average size of mandays employment per hectare land in the operations of both fruits and vegetables have been recorded fairly as much lower order as compared to the production of foodgrains. Considering these all facts in mind, it may be strongly pointed out that providing increasing initiatives toward crop diversification will certainly prove as an instrumental measure for widening the gainful employment opportunities for different sexes and different categories of labour-force in different areas.

USE OF HIRED LABOUR:

Since, it has universally been well recognised that labour requirement for undertaking different activities both in farm and non-farm in rural areas is mostly met out though local supply. In our analysis we also find that the various work related to undertaking the farming of both traditional food grains and non food grains is performed mainly through employing the available work force with the farm households across the various geographical locations. The analysis on share of hired labour in total labour employed in the production of various

food and non food crops presented in table 5.5 (d) shows that merely 10 per cent of farm employment is provided by hired labourers, comprising highest at 20.21 per cent in plantation of fruits followed by around 9 per cent in vegetables and a little over 7 per cent in food grains production.

However, the proportion of mandays employment of hired labour to total mandays employment has been largely varying across different geographical locations and in undertaking the production of various food and high value crops. The proportion of hired labour to total labourforce in the cultivation of both food and high value crops together constituted around 11 per cent each in high and low hill areas as against 5 per cent in middle hill areas. However the proportion of mandays employment of hired labour to total mandays employment in carrying out the cultivation of various food grain crops as well as high value crops have been noted remarkably higher in low hill area as compared in middle and high hill areas. Though, the proportion of hired labour to total labour use in the production of both fruits and vegetables has been witness fairly much high as compared to food grains crops in each of the geographical locations.

Table 5.5(e) Per Hectare Mandays Employment Of Family And Hired Labours By Locations

Crops	High Hills			Middle Hills			Low Hills			All Areas		
	Family workers	Hired workers	Total	Family workers	Hired workers	Total	Family workers	Hired workers	Total	Family workers	Hired workers	Total
Foodgrains	233	9	242	22	12	234	203	25	228	216	17	233
%	96.28	3.72	100.00	94.87	5.13	100.00	89.04	10.96	100.00	92.70	7.30	100.00
Fruits	402	100	502	490	72	562	227	83	310	379	96	475
%	80.08	19.92	100.00	87.19	12.81	100.00	73.23	26.77	100.00	79.79	20.21	100.00
Vegetables	518	54	572	556	43	599	451	53	504	516	50	566
%	90.56	9.44	100.00	92.82	7.18	100.00	89.48	10.52	100.00	91.17	8.83	100.00
All Crops	339	44	383	285	18	303	225	29	254	279	31	310
%	88.51	11.49	100.00	94.06	5.94	100.00	88.58	11.42	100.00	90.00	10.00	100.00

Further, the analysis related to the pattern of using hired and family labour in the farming system of various size categories of farms postulates the facts that the farmers farms with relatively lower size of holdings of below one hectare are meeting their labour demands mainly through employing their family workforce while the process of employing unpaid family labours get reduced significantly with the increase of the size of farms. As the proportions of hired labour to total labour use in the overall farming system of tiny farmers is noted as lower at 7.49 per cent while it increased 12.16 per cent for medium size of farms to 45.59 per cent for upper farm groups. Examining at the crop-wise use of hired labour the analysis shows that the reliance on hired labour is much more for plantation of fruits followed by growing of vegetables as compared to foodgrain crops in case of every size of farms, though the proportions of hired labour to total labour use in growing of high value crops and traditional food grains has seen positively well related to the size of farms. Even the proportion of mandays employment for hired labourers in total mandays employment in the cultivation of food grains is noted as high as over 41 per cent for upper size categories of farms as against a little over 4 per cent for each medium and bottom categories of farms.

Table 5.5 (f): Per Hectare Mandays Employment Of Family And Hired Labours By size of Holdings

CROPS	Below 1.00			1.00-2.00			2.00+		
	Family Workers	Hired Workers	Total	Family Workers	Hired Workers	Total	Family Workers	Hired Workers	Total
FOODGRAINS	249	12	261	186	8	194	73	52	125
%	95.40	4.60	100.00	95.88	4.12	100.00	58.40	41.60	100.00
FRUITS	452	103	555	303	68	371	147	128	275
%	81.44	18.56	100.00	81.67	18.33	100.00	53.45	46.55	100.00
VEGETABLES	464	47	611	419	60	479	142	52	194
%	75.94	7.69	100.00	87.47	12.53	100.00	73.20	26.80	100.00
ALL CROPS	321	26	347	224	31	255	74	62	136
%	92.51	7.49	100.00	87.84	12.16	100.00	54.41	45.59	100.00

A look into the structure of earnings of labourforce engaged in undertaking the cultivation of various food and high value crops presented in table 5.5(h) reveals that on an average a worker engaged in farming system is in a position to earn Rs.1100 per annum, comprising highest at Rs.1316 in middle hill areas to lowest at Rs.812 in high hill areas. Further it is reverted that in spite of the fact that using of cultivated land under the production of food grains have been providing relatively much lower level of net income per hectare, the average earnings of workers in the production of food grains has been noted relatively higher as compared to vegetables and fruits. It may be noted that the revealed higher per worker

earnings from the production of foodgrain as compared to various high value crops is mainly due to a very high per worker income generated from former cropping system in low hill areas. As the average earnings of workers in food grains production revealed as high as Rs.1676 in low hill areas as against Rs.1082 in middle hill areas and at Rs.534 in high hill areas. However, the per worker generation of earnings from the production of vegetables and spices together has registered highest at Rs.1727 in middle hill areas while the plantation of fruits has been providing fairly highest per workers earnings at Rs.1289 in low hill areas closely followed by Rs.1225 in high hill areas. In all, the net earnings per worker in undertaking the farming of operations together of foodgrain crops and various high value crops accounted only Rs.812 in high hill areas as against Rs.1295 in middle and Rs.1316 in low hill areas. However, these presented per worker earnings are the crude estimates without considering into account the per day average horse of work of the workforce.

Considering above facts in mind, it is presumed that the estimation of per day average earning being derived by the workers in undertaking different farming operations will provide a clear cut understanding in the extent of differences prevailing in the income generation potentials under various cropping options. On an average per day income generation potentials of farming has been estimated at Rs.33, consisting relatively higher at Rs.38 each in middle and low hill areas as compared to Rs.26 in high hill areas. Growing of vegetables and spices seems to be relatively better option as compared for opting the production of fruits and food grain crops in terms of originating income in the sample areas, especially in middle hill areas. However, in low and high hill areas undertaking the cultivation of fruits has been noted providing relatively higher earning as compared to food grains and vegetables. However, the income generation potentials in undertaking the cultivation of food grains are consistently related with the size of categories of farms.

Table-5.5(g) : Average Annual And Per Day Earnings Of Workers Under Different Options By Locations

OPTIONS	HIGH HILLS		MIDDLE HILLS		LOW HILLS		ALL AREAS	
	PER WORKER	PER DAY	PER WORKER	PER DAY	PER WORKER	PER DAY	PER WORKER	PER DAY
FOODGRAINS	534	17	1082	24	1676	37	1152	28
VEGETABLES & SPICES	665	24	1727	66	570	30	1011	40
FRUITS	1225	35	355	29	1289	71	1130	38
ALL OPTIONS	812	26	1295	38	1316	38	1100	33

Further, analyzing the pattern of per worker income generation across various size of farms, we find that the per worker annual earnings varied highest from Rs.1812 to lowest at Rs.964 for those are associated with medium and bottom size categories of farms

respectively. Also, the workers associated with medium size of farms are recognized originating significantly larger level of incomes from adopting almost the cropping system as compared to workers attached to bottom and upper size of farms. The pattern of per worker income generation potentials of farming in sample areas has also been positively related with the size categories of farms, being highest at Rs.1606 for upper groups of farms to lowest at Rs.964 for bottom groups of farms. Over and above the amounts of per day income being originated by workers from undertaking the cultivation of both traditional food grains crops as well as high value crops have been recognised relatively much above the level of per day wage rate of unskilled workers as prevailing in different sample areas.

Table 5.5(i): Average Annual And Per Day Earnings Of Workers Under Different Options By Size Of Holding

OPTIONS	(value in Rs.)					
	BELOW 1.00		1.00 - 2.00		2.00 +	
	PER WORKER	PER DAY	PER WORKER	PER DAY	PER WORKER	PER DAY
FOODGRAINS	990	25	2020	35	1729	63
VEGETABLES & SPICES	913	37	1683	54	1424	78
FRUITS	997	36	1618	40	1481	63
ALL OPTIONS	964	30	1812	40	1606	65

In short the analysis carried out in this part shows the high potential of crop diversification towards income enhancement. A very high alternative option in using available cultivated land under the production of various fruits, off- season vegetables, oilseeds and spices instead of its use under the very low productive traditional crops have been well visualized in various geographical locations. Though the farming households in low hill areas have been possessing greater advantages in opting the use of their land under the production of both traditional food crops as well as certain high value crops as compared in middle and high hill areas. But the per hectare pattern of the advantages deriving in net as well as gross income through undergoing the production of various high value crops, especially off season vegetables, have been recognised fairly larger in favour of high hill areas followed by middle hill areas and at lowest level in low hill areas.

The farming households in all the geographical locations have been deriving many folds higher gross as well as net income through using their land under the production of various high value crops as compared to the production of foodgrains, though the per hectare income being generated from growing of food and high value crops together has been reported significantly much higher in case of tiny farm holders than the medium and upper farm holders. In fact, the advantages in terms of originating per hectare income through opting the use of available arable land under the production of various high value crops have

also been largely going in favour of bottom farm groups of land holders and it declined consistently with the increase of the size of holdings.

Relatively a very high production cost involved in undertaking the cultivation of various high value crops, especially for all fruits and potato have been recognised one of the most important factors, limiting the scope for opting shift in cultivated land from the production of traditional food crops to using it under the production of high value crops in different geographical locations, but largely in high hill areas and in case of farmers owning tiny size of holdings of below one hectare. But, on the whole the output- input ratio in undergoing the production of various high value crops have been noted fairly much larger, ranging as high as 5.05 points for oilseeds to lowest at 2.59 points for spices, closely followed by 2.60 points for fruits.

On an average a shift of 1 hectare land from food grains to the plantation of fruits will bring an additional net income of Rs.11.56 thousand while it can fetch an additional income of Rs.7.39 thousand and Rs.6.88 thousand in favour of oilseeds and vegetables respectively. Thus, undergoing the farming system through opting the production of fruits in high hill areas, vegetables in middle and oilseeds and major food grains such as paddy and wheat in low hill areas would be the most alternative options for increasing the livelihood of farming households on a sustainable basis in respective areas.

Undertaking the cultivation of various high value crops, especially fruits and vegetable has also been indicated employing relatively much higher size of labourforce as compared to opting the cultivation of traditional food crops. Also the mandays employment as well as per workers productivity and income in undergoing the production of high value crops have been recorded significantly much higher than in the production of food grains in almost the geographical locations. However, the pattern of labour use and generation of mandays employment per hectare have been positively related with the size categories of land holdings. Also the pattern of generation net earning per worker in undertaking various farming operations have been largely been related with the size of farms in different geographical locations, but the per worker earning from the plantation of fruits has been estimated fairly much higher in high hill areas and it revealed highest from the growing of vegetables and spices in middle hills and in response to growing foodgrains in low hill areas.

CHAPTER –VI

PATTERN AND ARRANGEMENTS OF MARKETING

On the basis of analysis presented and discussed in the preceding chapters the study has reached in the stages to argue strongly that the farming communities in different geographical locations, irrespective of the size of cultivated land they are possessing are largely awared about using their available land under the most beneficial options of cropping system which option can maximize the per hectare net income and use of labour. It is, therefore, the area under various traditional foodgrains is on the consistent declining rate and its increasing shift can be well visualized into the production of various high value market oriented commercial crops such as fruits, off-season vegetables, oilseeds, spices and other non-food crops.

In addition, the farmers have also been involved in undertaking intensive farming though adopting various resources and inputs to maximize the productivity per hectare of various high value crops, even in case of cereal crops in certain valley and low land areas. As the consequences of these certain initiatives undertaken from the part of farming households the productivity levels and gross value of output per hectare for various crops have been consistently moving up to a fairly larger level in almost the areas as well as in each size of categories of farms. In continuation of these over existing findings the study further attempts to examine the extent to which the various size categories of farm holders are in a position to generate the surplus production of different foodgrain crops and other market oriented high value crops. In addition an assessments have also been undertaken about the extent and kinds of problems existing in properly marketing of the different surplus crops in opting different marketing channels and the possibilities of developing most beneficial alternative channels for marketing the various surplus food grains and high value crops in different locations. The analysis on developing alternative marketing channels is primarily based on the suggestions and perception of different categories of farm holders as covered in the present study.

I. PATTERN OF CONSUMPTION AND MARKETING SURPLUS

Considering into account the pattern of disposal of the various food grains and high value crops per household as presented in Table-6 the analysis reveals that a major quantity of food grains and oilseeds, accounting for 78 per cent and 81 per cent respectively, is retained by the farmers for the purpose of their self consumption and it using as seeds. However, a very high proportion of output ranging highest at 99.91 per cent of non food crops such as sugarcane followed by over 92 per cent fruits to lowest at 77 per cent off vegetables is sold out in the market. In all over 70 per cent of the farm produce has been selling out by the farmers in sample areas. Thus the overall analysis reveals that the production of various cereals including the pulses has generally been carried out by the farmers mainly for their own consumption requirements while the purpose of undergoing the production of various non-food grains is predominantly for selling them in the market so as to generate incomes for meeting out several expenditure of the in households.

On an average per household annual consumption requirement of food grains has been estimated to 764 kgs. Though it has been recorded at 29.52 qtls, together for all food and non-food grains. As far as the consumption pattern of various high value cash crops is concerned the per household consumption is recorded highest at 129 kgs for vegetables followed by 67 kgs for oilseeds, 37 kgs for fruits, 18 kgs for spices and lowest at 2 kgs for other non- food crops such as sugarcane.

(i) **Across The Regions:** Among different geographical locations the proportionate share of per household consumption in the gross quantity of output of food grains is registered highest at 96.10 per cent in high hill areas to lowest at 60.94 per cent in low hill areas. Also, per household volume of food grains sold in low hill areas stands as high as 654 kgs. as against only 60 kgs. in middle hill areas and 32 kgs. in high hill areas. However, extremely differential kind of situation is found emerging in terms of per household average quantity of high value crops are being sold in the market in case of different areas. Among different geographical locations, per household volume of sale for spices stand highest in favour of middle hill area, fruits in high hill areas and the oilseeds in low hill areas. Per household sale of fruits accounted 10.99 qtls. in high hill areas as against on 182 kgs. in low hill areas followed by only 27 kgs. in middle hill areas. Similarly, per household volume of vegetables being sold in the market stands as high as 592 kgs. in high hill areas followed by 445 kgs. in middle hill areas and lowest at 232 kgs in low hill areas.

Table 6: **Per Household Production, Sale And Consumption Of All Crops By Locations**
(quantity in qntl.)

CROPS	HIGH HILLS			MIDDLE HILLS			LOW HILLS			ALL AREAS		
	production	sale	consumption	production	sale	consumption	production	sale	consumption	production	sale	consumption
ALL FOOD-GRAINS	8.22	0.32	7.90	6.76	0.60	6.16	14.44	5.64	8.80	9.84	2.20	7.64
%	100.00	3.89	96.10	100.00	8.88	91.12	100.00	39.06	60.94	100.00	22.36	77.64
OILSEEDS	0.22	0.05	0.17	0.78	0.15	0.63	1.49	0.25	1.24	0.82	0.15	0.67
%	100.00	22.73	77.27	100.00	19.23	80.77	100.00	16.78	83.22	98.80	18.30	81.70
SPICES	0.59	0.21	0.39	4.79	4.75	0.05	0.17	0.09	0.08	1.81	1.63	0.18
%	100.00	35.59	66.10	100.00	99.16	1.04	100.00	52.94	47.06	100.00	90.06	9.94
FRUITS	11.68	10.99	0.69	0.52	0.29	0.23	2.01	1.82	0.19	4.83	4.46	0.37
%	100.00	94.09	5.91	100.00	55.77	44.23	100.00	90.55	9.45	100.00	92.34	7.66
VEGETABLES	8.04	5.92	2.12	5.49	4.45	1.05	2.99	2.32	0.67	5.52	4.24	1.29
%	100.00	73.58	26.42	100.00	81.06	19.13	100.00	77.59	22.41	100.00	76.81	23.37
NON-FOOD CROPS	0.01	0.01	0.01	0.00	0.00	0.00	34.41	34.40	0.003	11.56	11.55	0.003
%	108.11	54.05	54.05	0.00	0.00	0.00	100.00	99.97	0.01	100.00	99.91	0.02
ALL CROPS	28.76	17.48	11.28	18.35	10.23	8.12	55.51	44.53	10.97	34.38	24.23	10.15
%	100.00	60.78	39.22	100.00	55.75	44.25	100.00	80.22	19.76	100.00	70.48	29.52

Further, looking into the pattern of sale and consumption in relation to individual foodgrain crops, the analysis presented in table 6.1 shows that a most part of cereals produced in sample areas is retained by farming households themselves for their consumption requirements and using it as seeds while only little over 21 per cent of cereals, averaging 176 kgs per households are sold out in the market. Even the per household marketable surplus of the major cereals such as wheat and rice accounted only 86 kgs and 83 kgs respectively. However, the farming households located in high hill areas are not in a position to generate marketable surplus in case of cereals such as wheat and barley, in fact per household sale of each paddy, madua, sawan and other cereals accounted approximately 1 kg. Similarly, per household sale of cereals in middle hill areas ranges highest from 9 kgs for wheat to lowest at 2 kg each for barley and sawan. Even the per household volume of cereals generated for sale in low hill areas is also not much significant as it indicated ranging highest at 247 kgs for wheat followed by 238 kgs. for paddy to lowest at 1 kg for each sawan and madua. All together the proportion of cereals generated for selling in the markets accounts relatively highest at over 38 per cent in low hill areas followed by 5 per cent in middle hills areas and lowest at less than one per cent in high hill areas.

Table 6.1(a): **Per Household Production, Sale And Consumption Of Foodgrains by Locations**

(Quantity in Qtls)

CROPS	HIGH HILLS			MIDDLE HILLS			LOW HILLS			ALL AREAS		
	production	sale	consumption	production	sale	consumption	production	sale	consumption	production	sale	consumption
PADDY	0.73	0.01	0.72	1.60	0.07	1.52	5.90	2.38	3.52	2.75	0.83	1.92
%	100.00	1.37	98.63	100.00	4.38	95.00	100.00	40.34	59.66	100.00	30.18	69.82
MADUA	1.29	0.01	1.28	0.29	0.04	0.26	0.15	0.01	0.13	0.59	0.02	0.56
%	100.00	0.78	99.22	100.00	13.79	89.66	97.82	7.99	89.83	100.00	3.39	94.92
SAWAN	0.80	0.01	0.79	0.18	0.02	0.17	0.18	0.01	0.17	0.39	0.01	0.38
%	100.00	1.25	98.75	100.00	11.11	94.44	100.00	5.56	94.44	100.00	2.56	97.44
WHEAT	1.14	0.00	1.14	2.39	0.09	2.30	5.79	2.47	3.32	3.10	0.86	2.25
%	100.00	0.00	100.00	100.00	3.77	96.23	100.00	42.66	57.34	100.00	27.74	72.58
BARLEY	0.06	0.00	0.06	0.15	0.02	0.13	0.23	0.005	0.22	0.15	0.01	0.14
%	100.00	0.00	100.00	100.00	13.33	86.67	100.00	2.17	95.65	97.62	5.07	92.55
OTHER CEREALS	2.39	0.01	2.38	0.56	0.02	0.54	0.67	0.07	0.60	1.22	0.03	1.19
%	100.00	0.42	99.58	100.00	3.57	96.43	100.00	10.45	89.55	100.00	2.46	97.54
ALL CEREALS	6.42	0.04	6.37	5.17	0.26	4.91	12.92	4.95	7.97	8.20	1.76	6.44
URD	0.11	0.01	0.10	0.52	0.03	0.49	0.54	0.27	0.26	0.38	0.10	0.28
%	100.00	9.09	90.91	100.00	5.77	94.23	100.00	50.00	48.15	100.00	26.32	73.68
MASOOR	0.19	0.02	0.17	0.42	0.06	0.36	0.47	0.09	0.38	0.36	0.06	0.30
%	100.00	10.53	89.47	100.00	14.29	85.71	100.00	19.15	80.85	100.00	16.67	83.33
GRAM & PEAS	0.79	0.21	0.58	0.38	0.21	0.17	0.48	0.32	0.16	0.55	0.25	0.31
%	100.00	26.58	73.42	100.00	55.26	44.74	100.00	66.67	33.33	100.00	45.45	56.36
RAJMA/ BHATT/ GAHAT	0.72	0.04	0.68	0.27	0.05	0.23	0.02	0.00	0.02	0.34	0.03	0.31
%	100.00	5.56	94.44	100.00	18.52	85.19	100.00	0.00	100.00	100.00	8.82	91.18
PULSES	1.80	0.28	1.52	1.59	0.34	1.25	1.52	0.69	0.83	1.64	0.44	1.20
%	100.08	15.37	84.71	100.00	21.38	78.62	100.00	45.39	54.61	100.00	26.83	73.17
FOOD- GRAINS	8.22	0.32	7.90	6.76	0.60	6.16	14.44	5.64	8.80	9.84	2.20	7.64
%	100.00	3.89	96.11	100.00	8.88	91.12	100.00	39.06	60.94	100.00	22.36	77.64

Almost a similar situation is emerging in terms of marketable surplus being generated in case of various pulses in sample areas, though the proportion of pulses to its total production sold in market seems relatively higher as compared to the proportion of cereals, while the per household generation of surplus of pulses is registered much less than the case of cereals. Among different areas, per house hold marketable surplus of pulses is noted highest at 69 kgs in favour of low hill areas followed by 34 kgs in middle hill areas and lowest at 28 kgs in high hill areas. Like cereal crops, the per house hold volume of marketable surplus being generated in case of almost the pulse crops, except for local pulses as bhat, gahat and rajma, has been estimated relatively higher in low hill areas as compared to middle and high hill areas. Per household sale of local variety pulses registered to be 4 kgs in high hill areas and 5 kgs in middle hill areas while the entire produce of these pulses is self consumed by the households in low hill areas.

Average volume of production per household of various oilseeds has also been estimated only 82 kgs. which a major proportion of around 82 per cent is consumed by the farming households themselves and thus, the per household sale remains only 15 kgs. Even, this small quantity of per household sale of oilseeds undertaken by farming households should not be considered as the volume of marketable surplus of oilseeds in the sense that due to lack of access to the facilities of processing oilseeds into various oil products the farmers initially sold out the entire oilseeds than they purchase various oil products from the market according to their consumption requirements. Across various areas, per household sale of oil seeds varied highest from 25 kg in low hill areas to lowest at 15 kgs in middle hill areas and 17 kgs in high hill areas. It further revealed that only soybean is being sold out in middle and high hill areas. Such is not in case of low hill areas where the generation of marketable surplus has been reported is case of almost the oilseeds, excluding lahi.

Annual production per household for various spices together constitutes at 181 kgs. However, the farming households have been undertaking the production of various spices mainly for their commercial purposes. As indicated by the fact that the proportion of sale to the total production of all spices together constituted to over 90 per cent, in fact the corresponding proportion reaches as high as over 99 per cent for ginger followed by around 88 per cent for other spices and lowest at 62 per cent for chillies. Per household annual consumption of all spices together is estimated to 18, kgs. comprising fairly highest at 39 kgs in high hill areas to lowest at 5 kgs in middle hill areas followed by 8 kgs in low hill areas. Similarly, the proportion of sale of spices to its total volume of production also varied highest from 99 per cent in middle hill areas to lowest at around 36 per cent in middle hill areas. The

chillies seems to be the most popular and common crop which is grown in each of the geographical locations and its per household sale averages between 52 kgs and 21 kgs in response to middle and high hill areas respectively. The ginger has been noted as the other most important spice crop, which is grown largely in middle hill areas mainly for its commercial purposes.

Further, a look at the pattern of consumption and the generation of marketable surplus in response to individual fruits reveals that the overall motives of farming communities to opt for growing different fruits in various geographical location is mainly based on its market orientation. It is indicated by the fact that the share of sale in total quantity of production of various fruits accounted for over 91 per cent in sample areas, comprising as high as over 94 per cent in high hill areas closely followed by 91 per cent in low hill areas and lowest at 46 per cent in middle hill areas. Per household average size of fruits marketed constitute to 441 kgs and it ranges highest at 135 kgs for peach followed by 128 kgs for apple to lowest at 5 kgs for other fruits such as orange, guava, papaya etc. and 16 kgs. for litchi. The share of marketed fruits to total volume of production has been reported ranging highest from around 97 per cent for plum closely followed at 96 per cent for apple to lowest at 35 per cent for other fruits and 76 per cent for litchi. Further, the analysis shows that the farming households in middle hill areas have been selling almost the entire quantity of the production of peach, apple, apricot and plum in the market though the per household consumption of each of these fruits has been estimated to a very lower order ranging between 2 kgs to 4 kgs. In high hill areas the proportionate sale to total volume of production of fruits has been reported highest at 96 per cent for plum closely followed by 95 per cent of peach apple and peach and lowest at 84 per cent for apricot. In fact the per household sale of all fruits together varies to the extent of 392 kgs to 88 kgs. In low hill areas the highest per household sale accounted at 127 kgs for mango to lowest at 2 kgs for other fruits such as papaya, guava etc.

Growing of various off-season vegetables also seems to be largely carried out for commercial purposes beside to meet the household consumption requirement of the farmers in each of the geographical locations. In the per household annual production of 552 kg for vegetables, fairly a larger proportion of around 77 per cent of it is sold out in the market and remaining 23 per cent is retained together for self consumption, seeds etc. In fact, in the total volume of production of various vegetables the proportion of it sold out reaches to the extent of 82 per cent for each cabbage and tomato closely followed by 81 per cent for onion and it constitutes lowest at 49 per cent for other vegetables grown during the rainy season. However, among different vegetables which are grown in sample areas, per household

marketable surplus has been reported fairly very high at 285 kgs for potato followed by 64 kgs for onion and lowest at 9 kgs for tomato.

Table 6.1(b): **Per Household Production, Sale And Consumption Of Fruits By Locations**
(Quantity in Qtls)

CROPS	HIGH HILLS			MIDDLE HILLS			LOW HILLS			ALL AREAS		
	production	sale	consumption	production	sale	consumption	production	sale	consumption	production	sale	consumption
MANGO	0.00	0.00	0.00	0.12	0.06	0.06	1.36	1.27	0.09	0.50	0.44	0.05
%	0.00	0.00	0.00	100.00	50.00	50.00	100.00	93.38	6.62	100.00	88.00	10.00
PEACH	4.12	3.92	0.20	0.02	0.02	0.00	0.00	0.00	0.00	1.42	1.35	0.07
%	100.00	95.15	4.85	100.00	100.00	0.00	0.00	0.00	0.00	100.00	95.07	4.93
APPLE	3.91	3.73	0.18	0.02	0.02	0.00	0.00	0.00	0.00	1.34	1.28	0.06
%	100.00	95.40	4.60	100.00	100.00	0.00	0.00	0.00	0.00	100.00	95.52	4.48
APRICOT	1.05	0.88	0.17	0.03	0.03	0.00	0.00	0.00	0.00	0.37	0.31	0.06
%	100.00	83.81	16.19	100.00	100.00	0.00	0.00	0.00	0.00	100.00	83.78	16.22
PEAR	0.75	0.69	0.06	0.04	0.03	0.01	0.00	0.00	0.00	0.27	0.25	0.02
%	100.00	92.00	8.00	100.00	75.00	25.00	0.00	0.00	0.00	100.00	92.59	7.41
PLUM	1.75	1.68	0.07	0.02	0.02	0.00	0.00	0.00	0.00	0.60	0.58	0.02
%	100.00	96.00	4.00	100.00	100.00	0.00	0.00	0.00	0.00	100.00	96.67	3.33
LEETCHI	0.00	0.00	0.00	0.17	0.04	0.12	0.45	0.42	0.03	0.21	0.16	0.05
%	0.00	0.00	0.00	100.00	23.53	70.59	100.00	93.33	6.67	100.00	76.19	23.81
OTHER FRUITS	0.11	0.10	0.01	0.11	0.03	0.08	0.19	0.02	0.17	0.14	0.05	0.08
%	100.00	90.91	9.09	100.00	27.27	72.73	100.00	10.53	89.47	100.00	35.71	57.14
FRUITS	11.68	10.99	0.69	0.52	0.24	0.28	2.01	1.82	0.19	4.83	4.41	0.42
%	100.00	94.09	5.91	100.00	46.15	53.85	100.00	90.55	9.45	100.00	91.30	8.70

Across the different geographical locations per household generation of marketable surplus which actually sold in the market has been estimated highest at 497 kgs and 69 kgs for potato and cabbage respectively in high hill areas, and for onion tomato and other vegetable grown during season stands in the order of 135 kgs, 15 kgs and 31 kgs respectively in favour of middle hill areas. In low hill areas, per household sale has been reported significantly highest at 142 kgs for potato followed by 47 kgs for onion and lowest at 4 kgs for cabbage. However, the proportion of sale to total production in high hill areas is dominated by cabbage (86 per cent) followed by onion (82 per cent) and lowest at 18 per cent for rainy seasonal vegetables. In middle hill areas it is highest for potato (87 per cent) followed by 81 per cent each for tomato and cabbage and lowest at 54 per cent for rainy seasonal vegetables while in

each for tomato and cabbage and lowest at 54 per cent for rainy seasonal vegetables while in low hill areas the proportionate share is recognised ranging highest from 82 per cent to lowest at 77 per cent for tomato and potato respectively.

Table 6.1(c): **Per Household Production, Sale & Consumption Of Vegetables By Locations**

(Quantity in Qtls)

CROPS	HIGH HILLS			MIDDLE HILLS			LOW HILLS			ALL AREAS		
	production	sale	consumption	production	sale	consumption	production	sale	consumption	production	sale	consumption
POTATO	6.53	4.97	1.56	2.39	2.08	0.32	1.83	1.42	0.41	3.62	2.85	0.77
%	100.00	76.11	23.89	100.00	87.03	13.39	100.00	77.60	22.40	100.00	78.73	21.27
ONION	0.17	0.14	0.03	1.65	1.35	0.30	0.60	0.47	0.14	0.79	0.64	0.15
%	100.00	82.35	17.65	100.00	81.82	18.18	100.00	78.33	23.33	100.00	81.01	18.99
TOMATO	0.04	0.03	0.01	0.19	0.15	0.04	0.11	0.09	0.03	0.11	0.09	0.03
%	100.00	75.00	25.00	100.00	78.95	21.05	100.00	81.82	27.27	100.00	81.82	27.27
CABBAGE	0.80	0.69	0.12	0.68	0.55	0.13	0.05	0.04	0.01	0.51	0.42	0.09
%	100.00	86.25	15.00	100.00	80.88	19.12	100.00	80.00	20.00	100.00	82.35	17.65
OTHER	0.50	0.09	0.41	0.58	0.31	0.26	0.39	0.31	0.08	0.49	0.24	0.25
%	100.00	18.00	82.00	99.45	54.12	45.33	100.00	79.49	20.51	100.00	48.98	51.02
VEGETABLES	8.04	5.92	2.12	5.49	4.45	1.05	2.99	2.32	0.67	5.52	4.24	1.29
%	100.00	73.59	26.42	100.06	81.01	19.05	100.00	77.59	22.41	100.00	76.81	23.37

(ii) **Across the Size Categories of Holdings:** Further, the analysis presented in table 6.2 shows a very high positive relationship between the size of holding and per household quantity of production, sale and consumption of various farm produced take place in sample areas. By virtue of a relatively larger per household farm production together of food and non-food crops being achieved by upper size categories of farm holders they have been generating fairly a very high per household marketable of farm produced as compared to tiny and medium size categories of land holders. Per household sale of different farm produced together accounted to the extent of nearly 577 Qtls for upper farm holders followed by 68 qtls. for medium and lowest at 12.22 Qtls for bottom categories of farm holders. In fact the proportionate sale to gross quantity of production of different farm produced together is noted at highest rate of 94 per cent for upper farm holders to lowest at 57 per cent for bottom farm holders.

Similarly, per household sale of different food and non-food crops, accepting the case of spices is inversely well related to the size categories of farms. However, per household sale of

spices constituted highest at 505 kgs for medium size of farms to lowest at 13 kgs for upper size of farms. Per household annual sale of bottom farms groups is noted highest in case of vegetables (372 kgs.) followed by 322 kgs for fruits and lowest at 7 kgs for oilseeds. Similarly, per household sale in case of both medium and upper farm holders has been estimated highest at 475 Qtls and 35 qtls. respectively for non-food crops such sugarcane tobacco etc, and lowest at 13 kgs for spices and 62 kgs. for food grains respectively.

Further, the analysis depicted that the proportion of sale to gross volume of production of bottom farm groups of households has been estimated ranging highest from 91 per cent for fruits to lowest at 14 per cent for foodgrains while it stands highest in case of other non-food

Table 6.2 : Per Household Production, Sale and Consumption of Various Crops by size of Holdings

(quantity in Qtls.)

Crops	Size of Holdings (in hectares)								
	Below 1.00			1.00 - 2.00			2.0 and above		
	Production	Sale	Consumption	Production	Sale	Consumption	Production	Sale	Consumption
Food grains	8.47 (100.0)	1.16 (13.70)	7.31 (86.30)	16.89 (100.0)	6.18 (36.59)	10.71 (63.41)	60.33 (100.0)	48.28 (80.04)	12.04 (19.96)
Oilseeds	0.45 (100.00)	0.07 (15.56)	0.38 (84.44)	1.46 (100.00)	0.83 (56.85)	0.63 (43.15)	22.56 (100.0)	2.08 (9.22)	20.48 (90.78)
Spices	1.54 (100.0)	1.35 (87.66)	0.19 (12.34)	5.15 (100.0)	5.05 (98.06)	0.10 (1.94)	0.15 (100.0)	0.13 (86.67)	0.02 (13.33)
Vegetables	4.89 (100.0)	3.72 (76.07)	1.17 (23.93)	10.00 (100.0)	7.89 (78.04)	2.22 (21.96)	21.04 (100.0)	17.73 (84.27)	3.31 (15.73)
Fruits	3.54 (100.0)	3.22 (90.96)	0.33 (9.32)	14.34 (100.00)	13.56 (94.56)	0.78 (5.44)	35.06 (100.0)	34.09 (97.23)	0.97 (2.77)
Other non-food crops	2.70 (100.0)	2.70 (99.06)	--	34.60 (100.0)	34.57 (99.01)	0.03 (0.09)	474.62 (100.0)	474.62 (100.0)	--
All Crops	21.60 (100.0)	12.22 (56.57)	9.38 (43.43)	82.55 (100.0)	68.09 (82.48)	14.47 (17.52)	613.76 (100.0)	576.93 (94.00)	36.83 (6.00)

Note: Figures in parentheses indicate the percentages.

crops for both medium and upper size of farm households and lowest at 67 per cent for foodgrains for former size of farm households and 9 per cent for oilseeds for later size of farm households. Though this proportionate sale of both fruits and vegetables has been estimated significantly larger in case of both medium and upper size of farm households as compared to bottom size of farm households.

Further it revealed that the pattern of generating marketable surplus in terms of per farm household quantum of various cereals, has been highly positively related with the size

categories of farm holdings. As depicted that per household generation of marketable surplus of cereals accounts lowest at 94 kgs for bottom size of land holdings which trend to increase to 407 kgs for medium size of holdings and it reaches to the highest point of 43.84 qtls. for upper farm holdings.

Table 6.2(a) : **Per Household Production, Sale and consumption of Foodgrains by size of Holdings**

Crops	Quantity of Qtls								
	Size of Holdings (in hectare.)								
	Below 1.00			1.00 - 2.00			2.0 and above		
	Production	Sale	Consumption	Production	Sale	Consumption	Production	Sale	Consumption
Paddy	2.20 (100.0)	0.43 (19.55)	1.77 (80.45)	5.09 (100.0)	1.93 (38.60)	3.07 (61.40)	26 (100.0)	20.96 (80.62)	5.04 (19.38)
Mandua	0.60 (100.00)	0.01 (1.67)	0.59 (98.33)	0.43 (100.0)	0.10 (23.26)	0.33 (76.74)	0.10 (100.0)	--	0.10 (100.0)
Sawan	0.39 (100.0)	--	0.39 (100.0)	0.45 (100.0)	0.10 (22.22)	0.35 (77.78)	0.15 (100.0)	0.08 (53.33)	0.07 (46.67)
Wheat	2.57 (100.0)	0.47 (18.29)	2.10 (81.71)	5.16 (100.0)	1.83 (35.47)	3.33 (64.53)	26.80 (100.0)	21.54 (80.37)	5.26 (19.63)
Barley	0.13 (100.0)	--	0.13 (100.0)	0.32 (100.0)	0.07 (21.88)	0.25 (78.12)	0.15 (100.0)	0.15 (100.0)	--
Other Cereals	1.17 (100.0)	0.02 (1.71)	1.15 (98.29)	1.72 (100.0)	0.04 (2.33)	1.68 (97.67)	1.76 (100.0)	1.23 (68.89)	0.53 (30.11)
All Cereals	7.08 (100.0)	0.94 (13.28)	6.14 (86.72)	13.08 (100.0)	4.07 (31.12)	9.01 (68.88)	54.96 (100.0)	43.84 (19.77)	11.12 (20.23)
Urd	0.32 (100.0)	0.05 (15.63)	0.27 (84.37)	0.66 (100.0)	0.30 (45.45)	0.36 (54.55)	3.04 (100.0)	2.64 (86.84)	0.40 (13.16)
Masoor	0.31 (100.0)	0.03 (9.68)	0.28 (90.32)	0.72 (100.0)	0.17 (23.61)	0.55 (76.39)	1.72 (100.0)	1.42 (82.56)	0.30 (17.44)
Peas and Gram	0.43 (100.0)	0.14 (32.56)	0.29 (67.44)	1.93 (100.0)	1.45 (75.13)	0.48 (24.87)	0.46 (100.0)	0.31 (67.39)	0.15 (32.61)
Bhatt, Gahat and Rajma	0.33 (100.0)	0.01 (3.03)	0.32 (96.97)	0.48 (100.0)	0.18 (37.50)	0.30 (62.50)	0.15 (100.0)	0.08 (53.33)	0.07 (46.67)
All Pulses	1.39 (100.0)	0.23 (16.55)	1.16 (83.45)	3.81 (100.0)	2.11 (55.38)	1.70 (44.62)	5.37 (100.0)	4.45 (82.87)	0.92 (17.13)
All Foodgrains	8.47 (100.0)	1.16 (13.70)	7.31 (86.30)	16.89 (100.0)	6.18 (36.59)	10.71 (63.41)	60.33 (100.0)	48.28 (80.03)	12.05 (19.97)

Note: Figures in parentheses denote the percentages.

The tiny size of farm holders those are mainly confined in high and middle hill areas have been only generating the marketable surplus of mandua which per household sale even constituted to 1 kg and its share in the gross quantum of production is estimated to below two per cent points. Per household sale of upper size of farm holds is reported to be as high as 21.54 qtls. for wheat followed by 20.96 Qtls for paddy and lowest at 8 kgs for sawan while in case of medium farm holders it reported highest at 193 kgs for paddy closely followed by 183

kgs for wheat and lowest at 4 kg for miscellaneous cereals. The farmers with upper size of farms are witnessed selling around 81 per cent of the total production of each wheat and paddy crops as against the production quantity of around 39 per cent of paddy and 35 per cent of wheat in case of medium size of farm holders. This proportionate quantity of sale of paddy and wheat stand only 20 per cent and 18 per cent respectively for tiny size of farm holders.

Again the average quantity of per household sale of all pulses together has also been visualized largely positively related to the size of farms; ranging largest from 445 kgs. For upper farms to lowest at 23 qtls. for bottom farms. The proportionate sale of pulses to its total quantum of production also accordingly varied between 17 per cent to 83 per cent among the bottom and large size of farms. The per household surplus generated by bottom size of farm holders is estimated highest at 14 kgs for peas and gram to lowest at 1 kg for local pulses such as gahat, bhatt and rajma while it ranges highest at 145 kgs to lowest at 17 kgs of peas and gram and masoor respectively for medium size of farm holders. However, per household sale of upper size of farm holders stands as high as 2.64 qtls. for urd followed by 1.42 qtls for masoor and lowest at 31 kgs. for peas and gram.

Further analysing the pattern of generation of marketable surplus of various oilseeds across the different sizes of farms the study again finds an inverse relationship in establishing between the size of per household-marketed surplus of all oilseeds together and the size categories of farms. The bottom and upper farm groups of households are seen generating the surplus of only soyabean while such is not in case of medium farm holders. Per household sale of soyabean has been estimated highest at 208 kgs for upper size of farm households followed by 75 kgs for medium and lowest at 6 kgs for bottom size of farm holders. In addition to the generation of marketable surplus of soyabeen by the medium size of farm holders are also involved in generating the surplus of mustard and other local variety oilseeds which per household surplus however averages only at 1 kg and 3 kgs respectively.

As far as the selling pattern of various spices is concerned the analysis presented in Table 6.2(b) shows that per household sale of various spices together is highest at 505 kgs for medium size of farm holders, mainly due to a very high quantum per household sale of 435 kgs of ginger, followed by 135 kgs for bottom and lowest at 13 kgs for upper size of farm holders. The chilly seems to be the most popular spices grown in every part of the state both for its commercial purpose as well as for meeting the consumption requirements of the farm households. However, the proportionate quantity of sale of chilly to its size of production has been estimated fairly much larger as compared to what the its of quantity is retained by each

size categories of farm holders. Per household quantity of chilly sold out is estimated to be highest at 55 kgs for middle size of farm holders followed by 23 kgs for bottom and lowest at 13 kgs for upper size of farm holders.

Table 6.2(b): Per Household Production, Sale, and Consumption of Oilseeds and Spices by size of Holdings

(Quantity in Qtls)

Spices and Oilseeds	Size of Holdings (in ha.)								
	Below 1.00			1.00 - 2.00			2.0 and above		
	Production	Sale	Consumption	Production	Sale	Consumption	Production	Sale	Consumption
Mustard	0.08 (100.0)	--	0.08 (100.0)	0.26 (100.0)	0.01 (3.85)	0.25 (96.15)	19.97 (100.0)	--	19.97 (100.0)
Lahi	--	--	--	0.03 (100.0)	--	0.03 (100.0)	0.13 (100.0)	--	0.13 (100.0)
Soyabean	0.34 (100.0)	0.06 (17.65)	0.28 (82.35)	1.13 (100.0)	0.75 (66.37)	0.38 (33.63)	2.45 (100.0)	2.08 (84.90)	0.37 (15.10)
Others	0.02 (100.0)	--	0.02 (100.0)	0.04 (100.0)	0.03 (75.00)	0.01 (25.00)	--	--	--
All Oilseeds	0.45 (100.0)	0.07 (15.56)	0.38 (84.44)	1.46 (100.00)	0.79 (54.11)	0.67 (45.89)	22.56 (100.0)	2.08 (9.22)	20.48 (90.78)
Ginger	1.06 (100.0)	1.05 (99.06)	0.01 (0.94)	4.35 (100.0)	4.35 (100.0)	--	--	--	--
Chilly	0.40 (100.0)	0.23 (57.50)	0.17 (42.50)	0.63 (100.0)	0.55 (87.30)	0.08 (12.70)	0.15 (100.0)	0.13 (86.67)	0.02 (13.33)
Other	0.70 (100.0)	0.60 (85.71)	0.10 (14.29)	0.17 (100.0)	0.15 (88.24)	0.02 (11.76)	--	--	--
All Spices	1.54 (100.0)	1.35 (87.66)	0.19 (12.34)	5.15 (100.0)	5.05 (98.06)	0.10 (1.94)	0.15 (100.0)	0.13 (86.67)	0.02 (13.33)

Note: Figures in brackets indicate the percentage.

As indicated in preceding part of the analysis that the motives most of farming communities in opting for undergoing the production of various fruits is basically based on generating income so as to sustain their livelihood. However, by virtue of the availability of larger farm holdings the per household volume of production as well as sale of upper farm households is considered to be fairly much larger as compared to medium and bottom size categories of farm holders. In other words, per household quantum of both production and its sale have been positively related with the size of holdings. In the bottom size categories of farms, the average quantum of sale per household constituted highest at 105 kgs for apple followed by 0.88 kgs for peach 105 kgs for followed by 0.88 kgs for peach and lowest 5 kgs for

other fruits such as papaya, guava, onion, etc. On the other, per household average sale ranges highest from 10.73 Qtls for mango to lowest at 31 kgs for pear in case of farming households owing above two hectares of land. Similarly, the per household sale of fruits for medium size of farm holders has been estimated ranging highest from 527 kgs for peach followed by 354 kgs for apple to a lowest range of 9 kgs and 13 kgs respectively for litchi and other fruits as guava, orange, etc.

Table 6.2© : **Per Household Production, Sale and Consumption of Fruits by size of Holdings**

Quantity in Qtls.

Crops	Size of Holdings (in ha.)								
	Below 1.00			1.00 - 2.00			2.0 and above		
	Production	Sale	Consumption	Production	Sale	Consumption	Production	Sale	Consumption
Mango	0.31 (100.0)	0.27 (87.10)	0.04 (12.90)	0.79 (100.0)	0.67 (84.81)	0.12 (15.19)	11.13 (100.0)	10.73 (96.41)	-0.40 (3.59)
Peach	0.95 (100.0)	0.88 (92.63)	0.07 (7.37)	5.36 (100.0)	5.27 (98.32)	0.09 (1.68)	9.39 (100.0)	9.27 (98.72)	0.12 (1.28)
Apple	1.10 (100.0)	1.05 (95.45)	0.05 (4.55)	3.68 (100.0)	3.54 (96.20)	0.14 (3.80)	3.57 (100.0)	3.51 (98.32)	0.06 (1.68)
Apricot	0.30 (100.0)	0.24 (80.00)	0.06 (20.00)	1.06 (100.0)	1.01 (95.28)	0.05 (4.72)	0.85 (100.0)	0.83 (97.65)	0.02 (2.35)
Pear	0.26 (100.0)	0.23 (88.46)	0.03 (11.54)	0.41 (100.0)	0.38 (92.68)	0.03 (7.32)	0.32 (100.0)	0.31 (96.88)	0.01 (3.13)
Plum	0.39 (100.0)	0.38 (97.44)	0.01 (2.56)	2.48 (100.0)	2.36 (95.16)	0.12 (4.84)	3.70 (100.0)	3.69 (99.73)	0.01 (0.27)
Litchi	0.13 (100.0)	0.08 (61.54)	0.05 (38.46)	0.16 (100.0)	0.13 (81.25)	0.03 (18.75)	5.72 (100.0)	5.42 (94.76)	0.30 (5.24)
Other Fruits	0.11 (100.0)	0.05 (45.45)	0.06 (54.55)	0.41 (100.0)	0.09 (21.95)	0.32 (78.05)	0.37 (100.0)	--	0.37 (100.0)
All Fruits	3.55 (100.0)	3.18 (89.58)	0.37 (10.42)	14.34 (100.0)	13.47 (93.93)	0.87 (6.07)	35.06 (100.0)	33.77 (96.32)	1.29 (3.28)

Note: Figures in brackets indicate the percentage.

In regards to the marketing pattern of various off-season vegetables is concerned, the analysis presented in Table 6.2(d) also shows the production of different vegetables, especially those of potato, cabbage and tomato, which are grown wide spreadly in almost the areas of the state during each crop season, when these crops can not be grown in plain areas, is mainly based on their market orientation. However, the size of production per household of different vegetables is largely governed by the availability of the cultivated lands with the farming households.

Table 6.2(d) : **Per Household Production, Sale and consumption of Vegetables by size of Holdings**

Quantity in Qtls.

Crops	Size of Holdings (in ha.)								
	Below 1.00			1.00 - 2.00			2.0 and above		
	Production	Sale	Consumption	Production	Sale	Consumption	Production	Sale	Consumption
Potato	3.18 (100.0)	2.49 (78.30)	1.69 (21.70)	6.79 (100.0)	5.40 (79.53)	1.39 (20.47)	14.08 (100.0)	11.93 (84.73)	2.15 (15.27)
Onion	0.71 (100.0)	0.58 (81.69)	0.13 (18.31)	1.05 (100.0)	0.83 (79.05)	0.22 (20.95)	4.70 (100.0)	3.95 (84.04)	0.75 (15.96)
Tomato	0.10 (100.0)	0.08 (80.00)	0.02 (20.00)	0.08 (100.0)	0.06 (75.00)	0.02 (25.00)	1.14 (100.0)	0.97 (85.09)	0.17 (14.91)
Cabbage	0.43 (100.0)	0.36 (83.72)	0.07 (16.28)	1.38 (100.0)	1.18 (85.51)	0.20 (14.49)	0.41 (100.0)	0.32 (78.05)	0.09 (21.95)
Other Vegetables	0.46 (100.0)	0.22 (47.83)	0.24 (52.17)	0.80 (100.0)	0.41 (51.25)	0.39 (48.75)	0.72 (100.0)	0.56 (77.78)	0.16 (22.22)
All Vegetables	4.89 (100.0)	3.72 (76.07)	1.17 (23.93)	10.11 (100.0)	7.89 (78.04)	2.22 (21.96)	21.05 (100.0)	17.76 (84.37)	3.29 (15.63)

Note: Figures in parentheses denote the percentages.

Per household quantum of sale that took place from the bottom size categories of farm holders is reported to be highest at 249 kgs for potato followed by onion (58 kgs) and lowest at 22 kgs for other vegetables grown during the rainy season, while the average household sale for different vegetables ranges highest from 11.93 Qtls for potato to lowest at 32 kgs for tomato in case of upper size of farm holders and in between the range of 540 kgs and 6 kgs respectively for potato and tomato in favour of medium size of farm holders.

II. INVOLVEMENT OF FARM HOUSEHOLDS IN GENERATION OF MARKETABLE SURPLUS

Further, a detailed analysis has been carried out to examine the extent of food scarcity that has been prevailing among different geographical locations as well as in cases of various size categories of farm households. In addition, an assessment has also been carried out about the extent to which different size categories of farm households in different areas are involved in the generation of marketable surplus of different crops especially high value crops. Such analysis is expected will provide inside into the participation pattern of different farm groups of households in deriving benefits from opting the cultivation of various high value crops in different areas. The nature of problems and bottlenecks as arising in opting the utilisation of land under various high value crops has also been additionally examined.

The analysis presented in Table 6.3 reveals that a significant level of food scarcity is highly prevailing in different geographical locations, especially in relation to staple food such as paddy and wheat in high and middle hill areas. Even in agriculturally highly prosperous low hill areas a maximum of little over one-third proportion of farm households are in a position to generate surplus cereal crops that too of paddy and wheat crops only. Rather more alarming situation in terms of food scarcity has been emerging in high hill areas where the proportion of farm households reported to have been generating insufficient foodgrains constituted to around 98 per cent. In fact only one household has been reported generating surplus production of paddy while the production of wheat seems to be much below the level of consumption requirement of farm households. However, the situation of food security in middle hill areas seems to be slightly better than in high hill areas. As the proportion of farm households those are generating surplus cereal crops in middle hill areas accounted around 7 per cent. Altogether around 13 per cent of farm households have been recognized to be generating the marketable surplus of each paddy and wheat followed by 4 per cent for madua.

The proportion of farm households those are capable in generating surplus production of oilseeds accounted to little over 11 per cent though their proportion stands relatively higher at 14 per cent each in high and low hill areas as compared to nearly 10 per cent in middle hill areas. It has further been recognised that the potential of generating surplus production of local variety pulses seems to be quite significant in middle and high hill areas while the production other pulses, especially urd can be increased in low hill areas. Even, at present, the proportion of households generating surplus production of various local variety pulses constituted highest in former areas while those of urd in low hill areas.

Table-6.3: **Percentage Of Households Involved In Generating Surplus Foodgrains In Different Locations**

CROPS	HIGH HILLS	MIDDLE HILLS	LOW HILLS	ALL AREAS
PADDY	0.30	3.50	34.86	12.94
MANDUA	2.40	7.01	2.75	4.00
SAWAN	0.90	1.59	1.22	1.23
WHEAT	0.00	4.78	33.94	12.94
BARLEY	0.00	3.18	0.92	1.33
OTHER CEREALS	0.90	2.23	3.67	2.26
URD	1.50	5.10	13.76	6.78
MASOOR	2.10	6.37	5.50	4.62
PEAS AND GRAM	13.81	9.87	6.12	9.96
RAJMA AND BHATT/ GAHAT	5.11	5.10	0.31	3.49
TOTAL SAMPLE HOUSEHOLDS	(333) 100.00	(314) 100.00	(327) 100.00	(974) 100.00

Note: Figures in brackets are the actual number of house holds

A look into the pattern of generation of surplus production of various oil seeds as presented in Table 6.3(a) postulates the fact that despite a significant decline in both area and productivity of *soyabean* in almost the geographical locations at least some proportion of farm households, ranging highest at little over 12 per cent in the hill areas, closely followed by 10 per cent in middle hill areas and lowest at 5 per cent in high hill areas, have been involved in generating the surplus production of concerned crop. The surplus production of mustard is being generated by only less than one per cent households in low hill areas. Another around 2 per cent and less than one per cent households are also seen involved in generating the surplus production of other local variety oilseeds in low and high hill areas respectively. In case of various spices grown in different sample areas the proportion of farm households reported to have been generating the surplus of chillies ranges highest from little over 14 per cent in middle hill areas to lowest at around 2 per cent in low hill areas. The surplus production of ginger is being generated by a nearly one-fourth proportion of farming households in middle hill areas only while the generation of surplus production of other spices is undertaken by little over 5 per cent and 2 per cent of households in middle and low hill areas respectively.

Table-6.3(a): **Percentage Of Households Involved In Generating surplus Spices And Oilseeds In Different Locations**

CROPS	HIGH HILLS	MIDDLE HILLS	LOW HILLS	ALL AREAS
MUSTARD	0.00	0.00	0.61	0.21
SOYABEEN	4.80	9.55	12.23	8.83
OTHER OILSEEDS	0.60	0.00	1.83	0.82
GINGER	0.00	24.84	0.00	8.01
CHILLIES	4.50	14.33	1.53	6.67
OTHER SPICES	0.00	5.41	2.14	2.46
TOTAL SAMPLE HOUSEHOLDS	(333) 100.00	(314) 100.00	(327) 100.00	(974) 100.00

Note: Figures in brackets are the actual number of house holds

Considering into account the nature and extent of participation of various farm households in generating marketable surplus of different fruits, the surprising facts which appearing here are that in spite of a very larger productivity and net income for being generated by the farm households from the plantation of various fruits as compared to growing of different traditional foodgrain crops, even in case of very tiny size of farm holders, the proportion of farm households involved in generation of marketable surplus of various fruits to total sample households covered for the purpose of present study are noted to be less than one-fourth though the proportion of such households consisted highest at around 23 per cent

followed by 18 per cent in case of those are involved in originating the surplus of apple and peaches respectively while a lowest proportions of 2.26 per cent farm households are noted generating the surplus of *Litchi*.

Table-6.3(b): **Percentage Of Households Involved In Generating Surplus Fruits In Different Locations**

CROPS	HIGH HILLS	MIDDLE HILLS	LOW HILLS	ALL AREAS
MANGO	0.00	5.73	11.62	5.75
PEACH	52.85	1.27	0.00	18.48
APPLE	65.47	0.64	0.00	22.59
APRICOT	41.44	2.23	0.00	14.89
PEAR	36.64	1.91	0.00	13.14
PLUM	40.84	1.59	0.00	14.48
LEETCHI	0.00	0.64	6.12	2.26
OTHERS	6.61	9.55	2.75	6.26
TOTAL SAMPLE HOUSEHOLD	(333) 100	(314)100	(327)100	(974) 100

Note: Figures in brackets are the actual number of house holds

However, across the different geographical locations the proportions of households involved in originating surplus production of different fruits have been noted fairly much larger in high hill areas as compared to middle and low hill areas. In high hill areas a highest proportion of farm households are reported generating the surplus production of apple (65 per cent) followed by peach (53 per cent). Another, nearly 41 per cent of households have been generating the surplus of both plum and apricot followed by 37 per cent households for pear in the same areas. Similarly, in middle hill areas, the proportion of farm households generating at least some quantity of surplus in case of different fruits varied highest from 10 per cent for other fruits such as guava, papaya etc. to lowest at less than one per cent points for apple and litchi. The farming households in low hill areas have been seen generating the surplus production of only mango, litchi and other fruits as guava etc. in which process the proportion of households accounted to be in the order of 12 per cent, 6 per cent and 3 per cent respectively.

Further the emerging situation in the participation of farm households in favour of generating surplus production of various off-season vegetables has been recognized relatively better off as compared to the extent it was revealed in response to various fruits. It may be seen that around 55 per cent of farm households, comprising a little over 74 per cent in high hill areas, 51 per cent in middle hill areas and over 38 per cent are alone in a position to

originate at least some quantity of surplus production of vegetables. The analysis further shows that around 22 per cent households, comprising highest at over 39 per cent in middle hill areas followed by 22 per cent in low hill areas and lowest at around 5 per cent, are involved in the generation of surplus production of onion while a merely 6 per cent farm households in all sample areas together are in a position to generate surplus production of tomato. Similarly the proportion of households generating the surplus production of cabbage and vegetables which are grown during the rainy season, accounted for 16 per cent and 14 per cent respectively.

Efficiently developed marketing facilities and its easy access to facilitate the marketing of various crops produced in different areas have been considered not only as an important element for initiating to strengthened the crop diversification processes and maximising the share in the profit margin in favours of farmers but also for motivating and attracting the different size categories of farming households, especially tiny farm holders in favour of opting to initiate a shift in cropping pattern, i.e. through reducing area under the production of traditional foodgrain crops and bringing it under the production of various high value crops.

TAB-6.3 (c): **Percentage Of Households Involved In Generating Surplus Vegetables In Different Locations**

CROPS	HIGH HILLS	MIDDLE HILLS	LOW HILLS	ALL AREAS
POTATO	74.17	50.96	38.23	54.62
ONION	4.50	39.17	22.02	21.56
TOMATO	3.30	9.55	5.20	5.95
CABBAGE	22.22	22.61	2.45	15.71
OTHERS	6.61	21.97	14.68	14.27
TOTAL SAMPLE HOUSEHOLDS	(333) 100	(314) 100	(327) 100	(974) 100

Note: Figures in brackets are the actual number of house holds

III. PREVAILING MARKETABLE ARRANGEMENTS:

Keeping into consideration these facts in mind the study further proceeds to examine about the prevailing marketing arrangements for disposal of the surplus various crop produced and the proportion of different foodgrains, and high value crops are being sold out under different channels of marketing, kinds and nature of problems arising in properly selling of different produced and the possibilities and options to overcome from different highlighted problems by the sample farm households in different geographical locations.

The pre-harvest contractors and wholesalers have been recognised playing an important role in marketing of various food and non-food crops. As over 80 per cent of farm produced is seen sold-out by the farmers through contractors and wholesalers as against around 9 per cent within their villages, little over 6 per cent directly to the consumers and 3 per cent to the retail shopkeepers while only less than one per cent is disposed to the co-operative societies and Government Departments. Even the proportion of farm produced marketed through contractors and wholesalers has been recorded as high as over 90 per cent for each fruits and spices followed by vegetables (74 per cent) and lowest at 41 per cent for oilseeds and 70 per cent for foodgrain crops. Further it revealed that the farmers sell out a quite significant proportion of 37 per cent oilseeds and 21 per cent of foodgrains to their fellow village farmers.

Tale 6.4: **Sale Of All Crops Under Different Arrangements**

Percentage sale under different channels of marketing								
CROPS	within village	contractors	co-operative society/ govt. agencies	processors	retailers	consumers	TOTAL	Actual sale (in qnts)
FOODGRAINS	20.58	69.69	0.00	0.00	3.76	5.97	100.00	2138.22
OILSEEDS	37.08	40.72	0.66	1.67	7.57	12.30	100.00	149.95
FRUITS	0.83	90.05	0.30	4.57	1.69	2.55	100.00	4345.46
VEGETABLES	10.92	73.56	0.28	0.00	5.29	9.95	100.00	4126.59
SPICES	1.63	90.31	0.13	0.00	2.47	5.46	100.00	1588.28
ALL CROPS	8.58	80.14	0.12	1.63	3.42	6.11	100.00	12348.50

Further it revealed that the proportion of foodgrains sold out within the villages of farmers itself has been reported significantly highest at 62 per cent in high hill areas followed by 43 per cent in middle hill areas and lowest at little over 16 per cent in low hill areas. In low hill areas a highest proportion of over 77 per cent of sale of foodgrains takes place through contractors. A major proportion of various fruits, vegetables and spices is also sold out through middle men and wholesalers, through the concerned arrangements system of marketing of various farm produced, excepting the case of foodgrains, is highly prevalent in high hill areas as compared to middle and low hill areas. The proportion of farm produced sold out under the concerned arrangements constituted over 86 per cent in high hill areas as against 80 per cent in low hill areas and 69 per cent in middle hill areas. Even in case of various high value crops the proportion of produced sold out under this arrangements

reaches as high as over 98 per cent for fruits in low hill areas, 90 per cent for spices in middle hill areas and 88 per cent for vegetables in high hill areas.

The selling of various farm produced through wholesalers and middlemen have been reported as the least beneficial arrangement of marketing system which largely favours to the traders rather than to the farming households. But the selling of fruits and vegetables through wholesalers/middlemen is quite popular in various areas of the state for the past several generations. It has also been noted that farmers having larger orchards are not only involved in the production of fruits but they are equally involved in the marketing of fruits. The small growers are usually selling their fruits through these large growers under the prior-arrangement system of marketing.

Table:6.4 (a): **Sale Of Major Crops Under Different Arrangement by Locations**

LOCATION	Percentage sale under different channels of marketing							Actual sale (in qntis)
	Within village	Contractors	co-Operative society/ govt. agencies	Processors	Retailers	Consumers	TOTAL	
HIGH HILLS								
FOODGRAINS	61.62	1.76	0.00	0.00	29.12	7.50	100.00	106.13
OILSEEDS	31.02	41.25	0.00	13.20	14.52	0.00	100.00	175.57
FRUITS	0.69	89.45	0.35	5.35	1.85	2.31	100.00	3660.16
VEGETABLES	5.62	87.56	0.23	0.00	5.26	1.33	100.00	1970.10
SPICES	10.90	83.94	0.00	0.00	5.16	0.00	100.00	68.80
ALL CROPS	4.37	86.17	0.45	3.40	3.58	2.04	100.00	5980.76
MIDDLE HILLS								
FOODGRAINS	42.93	31.81	0.00	0.00	4.71	20.56	100.00	188.00
OILSEEDS	53.12	17.99	0.00	0.00	4.55	24.34	100.00	47.25
FRUITS	11.52	61.96	0.00	3.17	6.34	17.01	100.00	89.85
VEGETABLES	19.62	52.41	0.47	0.00	5.77	21.72	100.00	1396.47
SPICES	1.18	90.84	0.13	0.00	2.29	5.56	100.00	1490.05
ALL CROPS	12.70	68.79	0.27	0.09	4.09	14.06	100.00	3211.62
LOW HILLS								
FOODGRAINS	16.15	77.26	0.00	0.00	2.20	4.39	100.00	1844.09
OILSEEDS	30.48	54.52	0.00	0.00	7.83	7.17	100.00	83.00
FRUITS	0.10	98.01	0.00	0.00	0.00	1.89	100.00	595.35
VEGETABLES	8.66	76.12	0.08	0.00	4.48	10.66	100.00	760.01
SPICES	2.96	79.00	0.00	0.00	5.13	12.91	100.00	29.43
ALL CROPS	11.79	80.18	0.02	0.00	2.49	5.53	100.00	3311.88

The analysis also reveals that at least some proportion of fruits and oilseeds are being directly sold out to the processors in high and middle hill areas while the co-operative societies and different government departments have been playing a little role in arranging for procurement of various farm produces. The proportion of farm produced sold out under the concerned arrangement constitute much below the level of one per cent point in case of each locations. The farmers in different locations have also been noted enjoyed in undertaking the sale of their farm produced directly to the retailers and consumers as well. Though the proportion of various farm produced sold out under both the arrangements together constituted at 18 per cent in middle hill areas, 8 per cent in low hill areas and 6 per cent in high hill areas.

Further, the analysis revealed that in the aggregate quantum of sale of various farm produced, the proportionate sale of it sold-out through wholesalers and contractors has been reported highest at around 98 per cent for upper size of farms to lowest at 76 per cent for bottom size of farms. Even, the farmers with upper size of farms are noted selling their entire quantum of vegetables, spices and fruits through contractors and wholesalers while incase of bottom size categories of farm holders the proportion of sale performed through such channel constituted highest at 89 per cent for spices, closely followed by 85 per cent for fruits and lowest at 41 per cent for oilseeds. The proportionate sale under concerned arrangement for medium size of farm holders ranges highest from over 99 per cent for fruits to lowest at 32 per cent for oilseeds. However the proportion of sale of different farm produced undertaken directly to processors, has been reported only in case of tiny and medium size categories of farm holders which constituted little over 2 per cent and only 0.08 per cent respectively. A significant proportion of foodgrains, and oilseeds are also visualised being sold out within the villages itself by the concerned size of farm households. The proportion of farm produced sold out to most profitable channels such as directly to the consumers and retailers have been negatively related with the size categories of farms as being highest at 11 per cent for tiny size of farms to closely followed by 9 per cent for medium and lowest at the point of below one per cent for upper size categories of farm holders.

The bottom and medium size of farm holders are further visualized selling their produced vegetables largely either to the retailers or directly to the consumers. However, a major share sale of different oilseeds take place within the villages of farmers itself in case of each size of farm holders and this share ranges highest at 42 per cent to lowest at 33 per cent for bottom and upper size categories of farm holders respectively. But a major share of overall farm produced, mainly various high value crops produced such as fruits and vegetables, is sold

out through a least beneficial marketing channels such as middlemen, wholesalers and contractors for the past several years in different areas.

Table: 6.4 (b) : **Sale Of Major Crops Under Different Arranements By Size Of Holdings**

	Percentage sale under different channels of marketing							
SIZE OF HOLDING (Hects.)	within village	Contractors	co-operative society/ govt. agencies	processors	retailors	consumers	TOTAL	Actual sale (in qntls)
BELOW 1.00								
FOODGRAINS	20.91	68.09	0.00	0.00	5.44	5.56	100.00	1028.47
OILSEEDS	41.59	40.64	0.00	0.00	4.06	13.72	100.00	57.95
FRUITS	1.27	84.71	0.66	7.02	2.59	3.75	100.00	2844.47
VEGETABLES	14.42	67.69	2.36	0.00	5.58	9.95	100.00	3281.04
SPICES	2.17	88.78	0.17	0.00	2.86	6.01	100.00	1192.58
ALL CROPS	8.43	75.85	0.32	2.36	4.04	6.78	100.00	8404.51
1.00 - 2.00								
FOODGRAINS	35.87	44.78	0.00	0.00	5.04	14.31	100.00	482.05
OILSEEDS	37.69	31.54	0.00	3.08	13.08	14.62	100.00	65.00
FRUITS	0.00	99.38	0.00	0.00	0.31	0.31	100.00	1057.83
VEGETABLES	3.22	77.37	0.00	0.00	6.12	13.29	100.00	615.06
SPICES	0.00	94.92	0.00	0.00	1.27	3.81	100.00	393.95
ALL CROPS	8.31	80.83	0.00	0.08	2.94	6.83	100.00	2613.89
2.00 and ABOVE								
FOODGRAINS	1.98	97.79	0.00	0.00	0.00	0.24	100.00	627.70
OILSEEDS	33.33	66.67	0.00	0.00	0.00	0.00	100.00	27.00
FRUITS	0.00	99.76	0.00	0.00	0.00	0.24	100.00	443.16
VEGETABLES	0.00	100.00	0.00	0.00	0.00	0.00	100.00	230.49
SPICES	0.00	100.00	0.00	0.00	0.00	0.00	100.00	1.75
ALL CROPS	1.85	97.96	0.00	0.00	0.00	0.19	100.00	1330.10

IV. PROBLEMS IN MARKETING OF FARM PRODUCED:

In the context of planning for initiating agricultural diversification, an assessment into the nature and kinds of problems emerging in marketing of different farm produced; especially high value market oriented crops has been considered as an important subject. Keeping these facts into consideration the study further attempts to assess the perceptions and experiences of

only such farmers those are engaged in the generation of marketable surplus and selling of various farm produced under the available channels of marketing in different locations, regarding the kinds of problems they have been facing in properly marketing of their various farm produced.

Thus the presentation of analysis undertaken in this regard in Table 6.5 reveals that of the 532 farm households engaged in selling out of various farm produced, around 68 per cent of them, comprising highest at 73 per cent in middle hill areas followed by 68 per cent in high hill areas and lowest at 60 per cent in low hill areas have been experiencing at least some kind of problem in marketing of the farm produced. Availability of low prices of the farm produced and inaccessibility to transport and market facilities have been indicated as the main problems that the farm households have been facing in marketing the farm produced. Monopoly of middle men in the fixation of prices of the produced, and lacking the facilities of storage, packaging materials and grading are some of the additional problems being faced in selling of different farm produced, especially for fruits and off seasonal vegetables. The proportion of farmers who complained that they are not receiving reasonable prices for their farm produced accounted highest at nearly 57 per cent and their proportion varied lowest from 53 per cent in high hill areas to highest at 65 per cent in middle hill areas. The obvious reasons for not realization of reasonable prices of various farm produced could be due to the facts that a largest proportions of farm households have been making the practices of selling different farm produced, especially fruits and vegetables well before their harvesting to the pre-harvest contractors. Lacking access to transport and its related facilities seems to be the second most constraint arising in properly marketing of farm produced of a little over one-third proportion of farmers, though the respective proportion of farmers constitute highest at 44 per cent in high hill areas followed by 33 per cent in middle hill areas and lowest at 19 per cent in low hill areas. The problem of in accessibility to the facilities of markets and transport together seems to be highly prevalent in high and middle hill areas. In fact around one-fourth proportion of the farmers have indicated that they have to cover a long a distance to reach the nearest marketing centre or the road heads for selling their farm produces. Monopolistic nature shown by the middlemen in fixation of prices of the produce has been complained by a little over 11 per cent of the farmers while a little over 4 per cent farmers belonging each to high and middle hill areas reported that they are lacking the facilities of cold storage and another 8 per cent farmers in high hill areas and 2 per cent farmers each low and middle hill areas complained that inadequacy in the availability of packaging materials and lacking proper grading facilities are largely reducing the marketing potentials for fruits and vegetable crops.

Table: 6.5: **Kinds of Problems Existing in Marketing of Farm Produced by Locations**

Kinds of Problems	Number of Households by Locations			
	High Hills	Middle Hills	Low Hills	All Areas
Low Prices	131	104	68	303
	(53.04)	(65.00)	(54.40)	(56.95)
Transportation	108	51	24	183
	(43.72)	(31.88)	(19.20)	(34.4)
To cover long Distances for Markets	55	43	4	102
	(22.27)	(26.58)	(3.20)	(19.17)
Monopoly of the Middle men	43	10	8	61
	(17.41)	(6.25)	(6.40)	(11.47)
Lacking Storage Facilities	15	7	0	22
	(6.02)	(4.38)		(4.14)
Inaccessibility to Packaging Materials and Proper Grading Facilities	20	3	3	26
	(8.10)	(1.88)	(2.40)	(4.89)
Others	10	12	2	24
	(4.05)	(7.50)	(1.60)	(4.51)
Households Facing Problems	169	117	75	361
	(68.42)	(73.13)	(60.00)	(67.86)
Households not Facing Problems	78	43	50	171
	(31.58)	(26.87)	(40.00)	(32.14)
Total Households	247	160	125	532
	(100.00)	(100.00)	(100.00)	(100.00)

IV. OPTIONS FOR SOLVING EMERGING MARKETING PROBLEMS:

Undertaking the initiatives for controlling to and fixation of prices of various farm produced, formation of co-operative societies of farmers, establishment of marketing centres in the form of sub-mandies, introduction of providing subsidy on the costs of transportation on the pattern as provided for industrial produced for transporting of goods from the production centres to the road and railway heads, and the establishment of Government procurement centres and cold-storage and godowns in different geographical locations have been cited as the most important measures by the different categories for farmers, to be initiated for improving the marketing efficiency for various farm produced, especially high for value market oriented crops.

Table 6.6: Options for Solving the Emerging Problems of Marketing by Locations

Sl. No.	Options for Solving Marketing Problems	No. of Household By Locations			
		High Hills	Middle Hills	Low Hills	All Areas
1.	Establishment of Govt. Purchase Centres	44 (17.81)	38 (23.75)	13 (10.40)	95 (17.86)
2.	Control and Fixation of Prices	85 (34.41)	65 (40.63)	49 (39.20)	199 (37.41)
3.	Subsidy on Transport	82 (33.20)	46 (28.75)	17 (13.60)	145 (27.26)
4.	Formation of Co-operative Societies	65 (32.32)	64 (40.00)	36 (28.80)	165 (31.01)
5.	Access to Cold Storage & Godown Facilities	53 (21.46)	22 (13.75)	11 (08.80)	86 (16.17)
6.	Establishment of Sub-Mandies	78 (31.58)	55 (34.38)	6 (04.80)	139 (26.13)
7.	Access to better Quality Seeds & Plants	47 (47.03)	17 (10.63)	5 (04.00)	69 (12.97)
Total Households		247 (100.00)	160 (100.00)	125 (100.00)	532 (100.00)

In detail, a highest proportions of over 77 per cent households consisting 41 per cent in middle hill areas, 39 per cent of low hill areas and 34 per cent in high hill areas have suggested in favour of bringing Government control over the fixation of prices of different farm produces. Formation of co-operative societies of farming households and undertaking the sale of various farm produces through these societies have been cited by a second majority of 31 per cent farmers, comprising a highest proportion of 40 per cent those belonging to middle hill areas followed by a little over 32 per cent in high hill areas and 29 per cent in low hill areas. Similarly, the introduction of subsidy on the transport cost involved in carrying out farm produce from the villages to the nearest marketing centres has been mainly recommended by the farmer of high and middle hill areas where the facilities of transports are largely lacking. Another 26 per cent and 18 per cent farming households have suggested for the establishment of purchase centres in the form of sub-mandies and government procurement centres for different farm produces respectively. Remaining 16 per cent and 13 per cent farmers respectively recommended in developing the facilities of cold storages, and godowns and securing the supply of improved variety seeds and plants as per the requirements of the farmers respectively.

CHAPTER VII

PERSPECTIVES AND PLANNING FOR AGRICULTURAL DIVERSIFICATION

The potential in initiating agricultural diversification through maximizing the use of arable land under the production of various high value crops such fruits, off-season vegetables, spices etc. through minimising land under the cultivation of traditional food grain crops so as to maximize per hectare income levels and to achieve increasing improvements in the livelihood situations of farming households have been clearly demonstrated by the analysis presented in preceding part of the present study. Both, per hectare as well as per household amounts of net income being originated from the production of every high value crops, especially most market oriented crops such as fruit and off-season vegetables have been witnessed remarkably many folds higher as compare to opting the farming of various traditional food crops. In fact the elasticity of providing gainful employment opportunities with fairly larger per worker productivity and earning has been well recognised in opting to confine on the farming of former categories of crops as compared to latter one.

However, a more striking feature which has been emerging is that in spite of various area specific greater advantages available in terms of opting for the cultivation of certain high value crops so as to maximise per hectare incomes from the available cultivated lands, the proportion of farm households involved in reaping such available advantages accounted for only around 55 per cent. Considering these facts in mind the present study further attempts to examine the possibilities of expansion in area under the production of various high value market oriented crops and the perceptions of farm households regarding their future perspectives for initiating agricultural diversification. More specifically the present chapter deals to investigate about the factors and elements which have been motivating to the farmers for undergoing the production of certain high value and market-oriented crops, types of problems arising in shifting cultivation from traditional food crops to certain high value crops and the kinds of measures to be initiated to overcome from such problems.

MOTIVATING FACTORS TO AGRICULTURE DIVERSIFICATION:

It should be clearly noted that almost the farm households in various areas are evolved in the production of various fruits, spices and vegetables. But the households engaged in growing these high value added crops for commercial purposes are numbering to 532 only. Further, in order to investigate the issues pertaining to why only some households have been growing such high value and market oriented crops on a larger scale for commercial purposes while others are practically not reluctant to take such initiatives, the present study attempts to examine about what kinds of elements have been motivating to the farmers for opting the cultivation of various high value crops in different areas. The concerned analysis is based only on the perceptions of 532 farmers who are presently involved in producing various high value crops for commercial purposes.

Suitability of land, certain area specific available advantages, profitable affairs and prevailing traditional concepts have been noted as the dominant factors influencing to the different size categories of farm households in opting for growing various value crops on commercial basis in different sample areas. The proportion of households who motivated for growing high value crops due to the factors such as suitability of available land and other favourable advantages as provided by the nature for growing certain crops accounted highest at 43 per cent, though the proportion of such households varied highest from 74 per cent in low hill areas to lowest at 23 per cent in high hill areas followed by 49 per cent in middle hill areas. The motive of deriving comparably higher per hectare income though opting the use of available land under the production of various high value crops than under the low value traditional food grains have been influenced to a second majority of around 40 per cent households, comprising significantly highest at around 46 per cent in middle hills followed by 41 per cent in low hills and lowest at 34 per cent in high hill areas. Another around 30 per cent of the farm households have reported that growing of various market oriented crops is their traditional occupation which process is continuing for the last several centuries, though such households are largely concentrated in high hill areas. And a significant proportion of the farm households were also motivated by the follow farmers (10 per cent) relatives and friends (12 per cent) and by the Government Departments (4 per cent) for growing different areas specific niche based high value market oriented crops in their available lands. Lacking employment opportunities in other economic sectors has also forced to around 8 per cent farmers, consisting 9 per cent in high hills, 8 per cent in middle hills and lowest at 4 per cent in low hills for opting the cultivations of high value crops so as to maximize per hectare income from their farms.

Table-7: Factors Motivated for Growing Various High Value Crops in Different Geographical Locations

Sl. No.	Factors	Locations			
		High Hills	Middle Hills	Low Hills	All areas
1.	Suitability of Land and other local advantages	56 (22.67)	79 (49.38)	92 (73.60)	227 (42.67)
2.	Relatives/friends	43 (17.41)	37 (23.13)	23 (18.40)	103 (19.36)
3.	Follow Farmers	16 (6.48)	23 (14.38)	15 (12.00)	54 (10.15)
4.	Help from the Govt.	07 (2.83)	3 (1.88)	12 (9.60)	22 (4.14)
5.	Lacking Employment	20 (8.10)	15 (9.38)	5 (4.00)	40 (7.52)
6.	Profitability	84 (34.01)	73 (45.63)	52 (41.16)	207 (38.90)
7.	Traditional	126 (51.01)	29 (18.13)	2 (1.60)	157 (29.51)
Households Engaged in Growing High Value Crops		247 (100.00)	160 (100.00)	125 (100.00)	532 (100.00)

Note : Figures in brackets indicate the percentages to row totals.

Among the various size categories of farm holders those were influenced by factor such as suitability of land and various areas specific advantages in growing of high value crops accounted highest at 86 per cent in case of farmers owning above two hectares of land followed by a little over 54 per cent medium size of farms holders and lowest at 41 per cent of tiny farm holders. Infact almost a similar proportion of farmers among medium and upper size of holdings were motivated to opt the cultivation of high value crops by way of considering it fairly a larger profitable option as compared to growing of traditional food grain crops. Growing of high value crops have been recognized as a traditional form of activity for over one third of the tiny farm holders and a little over 3 per cent of medium size category of farm holders. Similarly, the proportion of farm households who were motivated by different Government Departments in favour of undertaking the production of these high value crops also belonged to only tiny and medium size categories of farm holding 4.06 per cent and 5.26 per cent respectively (Table 7.1).

Table 7.1: **Factors Motivated for Growing High Value Crops by Size of Land Holdings**

Sl. No.	Factors	Size of Holdings (in hectares)		
		Below 1.0	1.00 - 2.00	2.00 & above
1.	Suitability of Land and other local advantages	190 (40.60)	31 (54.39)	6 (85.71)
2.	Relatives/friends	79 (16.88)	22 (38.60)	2 (28.57)
3.	Fellow Farmers	50 (10.68)	3 (5.26)	1 (14.29)
4.	Help from the Govt.	19 (4.06)	3 (5.26)	-
5.	Lacking Employment	25	14	1
6.	Profitability	172 (36.75)	29 (50.88)	6 (85.71)
7.	Traditional	155 (33.12)	2 (3.15)	-
Households Engaged in Growing High Value Crops		468 (100.00)	57 (100.00)	7 (100.00)

Note: Figures in brackets indicate the percentages to row totals.

PERCEPTIONS ON INITIATING AGRICULTURAL DIVERSIFICATIONS:

The extent to which the possibility in initiating agricultural diversification existing in various locations have been further assessed through enquiring among the sample farm households about their willingness and expected future planning in bringing additional land area under the production of various high value crops by way of reducing area under food grain crops. Incorporating the perceptions of farm households in this regards we find that a little over one third of sample farm households, comprising relatively a highest proportion of 42 per cent in low hill areas, closely followed by 41 per cent in middle hill areas and a lowest proportion of 30 per cent in high hill areas are planning to add at least some cultivated land area under the production of various high value and market oriented crops (Table 7.2).

Table 7.2: **Perceptions of Farm Households for Initiating Agricultural Diversification in Different Areas**

Sl. No.	Perceptions	Number of households by Locations			
		High Hills	Middle Hills	Low Hills	All areas
1.	Yes	101 (30.33)	129 (41.08)	138 (42.20)	368 (37.78)
2.	No	232 (69.67)	185 (58.92)	189 (57.80)	606 (60.66)
Total		333 (100.00)	314 (100.00)	327 (100.00)	974 (100.00)

Inquiring among these farm households regarding what kinds of factors have been motivating them to initiate for opting the cultivation of various high value crops instead of maintaining the traditional farming practices of growing various food grain crops; the perceptions of a majority of over 86 per cent farm households are that the using of available land under growing of former category crops is larger beneficial in terms of deriving higher per hectare income as compared to latter categories of crops. Suitability of land for growing various high value crops and increasing demands in the markets for various market oriented crops have been influencing to another little over 16 per cent and 10 per cent farm households respectively for increasing area under these high value crops.

Table 7.2 (a): **Reasons for Initiating Agricultural Diversification by Locations**

Sl. No.	Reasons	Number of households by Locations			
		High Hills	Middle Hills	Low Hills	All areas
1.	Profitable	94 (93.06)	113 (87.60)	110 (79.71)	317 (86.14)
2.	Increasing Market Demands	8 (7.92)	14 (10.85)	15 (10.87)	37 (10.05)
3.	Suitability of Land	16 (15.84)	17 (13.08)	36 (126.09)	69 (16.03)
All Household		333 (100.00)	129 (100.00)	138 (100.00)	368 (100.00)

Considering into account the proportion of farm households planning for expansion of area under various high value crops among different size categories of farm households it reveals that the problems of limited availability of cultivated land with the farm households has been invariably largely limiting their scope for planning in making any addition in area under the production of various high value crops. This can be directly assessed by the fact that the proportions of households those are planning for agricultural diversification through increasing area under high value crops are positively significantly related with the size categories of farm holdings being lowest proportion of 35 per cent of households in bottom size of farms to 60 per cent and 85 per cent households in medium and upper size of farms respectively (Table 7.2(b)).

Table 7.2 (b): **Perceptions of Households for Increasing Area under Various High Value Crops by Size of Holdings**

(holdings in hectare)

Sl. No.	Perceptions	No. of Households by Size of Holdings			
		Below 1.0	1.0-2.0	2.0 and above	All Groups
1.	Yes	310 (35.11)	47 (60.26)	11 (84.62)	368 (37.78)
2.	No	573 (64.89)	31 (39.74)	2 (15.38)	606 (60.66)
Total		883 (100.00)	78 (100.00)	13 (100.00)	974 (100.00)

The understanding of farmers in terms of using land under the production of various non-food market oriented crops can provide significantly higher per hectare returns as compared to non-food crops have been motivating to a larger proportion of over 87 per cent farm households owning one to two hectare of land and closely followed by 86 per cent tiny farm holders and a lowest proportion of 72 per cent upper categories of farm holders for initiating to bring additional land areas under the production of former categories of crops. Comparatively higher suitability of land to grow various high value crops than the traditional food crops seems to be influencing to a highest proportion of 45 per cent households with above two hectares of holdings and a lowest proportion of 17 per cent of tiny farm holders. Similarly, around 11 per cent of farm households with less than one hectare land followed by 9 per cent with above two hectares of holdings and a lowest proportion of 4 per cent medium size of farm holders have also reported that the increasing marketing potential of various high value crops have been influencing them to opt for adding area under the production of concerned crops.

Table 7.2(c): **Reasons for Opting the Cultivations of Various High Value Crops by Size of Holdings**

(holdings in hectare)

Sl. No.	Reasons	No. of House Holds Size of holdings		
		Below 1-0	1-0 – 2-0	2.0 and above
1.	Profitable	268 (86.45)	41 (87.21)	8 (72.72)
2.	Increasing Market Demands	34 (10.97)	2 (4.26)	1 (9.09)
3.	Suitability of Land	53 (17.10)	11 (23.40)	5 (45.45)
All Household		310 (100.00)	47 (100.00)	11 (100.00)

A detailed analysis has further undertaken in table 7.2 (d) regarding the perceptions of farmers in response to their future planning for increasing land area under various high value crops. The analysis shows that a significantly highest proportion of around 43 per cent of the sample households have been planning for expansion of area under different fruits, followed by 25 per cent under herbals and a lowest proportion of around 4 per cent under other non-food crops such as tea plantation and oilseeds. However, in high hill area the proportion of households intending to allot at least some additional land under the plantation of various herbals plans are noted fairly highest at 39 per cent followed by those planning to add area under fruits (31 per cent) while around 21 per cent of households are expected will bring some area under the plantation of flowers. However, in both middle and low hill areas, a highest proportion of households, comprising 44 per cent and 51 per cent respectively are planning to

expand the area under the plantation of fruit orchard while a second majority of 26 per cent households in middle hill areas and 23 per cent households in low hill areas are intended to increase the cultivated land area under the production of various spices, especially ginger and vegetable respectively. Another a significant proportion of households in both middle (23 per cent) and low hill areas (17 per cent) are also initiating to grow the various herbals. However, the proportion of households planning for making expansion in area under vegetables are noted merely 7 per cent in high hill areas and 5 per cent in middle hill areas, a similar proportion of households in respective areas have been planning to initiate the plantation of tea.

Table 7.2 (d): **Perceptions of Farm Households Planning For Expansion in Area under Various High Value Crops by Locations**

Sl. No.	Crops	No. of Households by Locations			
		High Hills	Middle Hills	Low Hills	All areas
1.	Fruits	31 (30.69)	57 (44.18)	70 (50.72)	158 (42.95)
2.	Vegetables	7 (6.93)	6 (4.65)	32 (23.19)	45 (12.23)
3.	Spices	21 (20.79)	33 (25.58)	14 (10.14)	68 (18.48)
4.	Flowers	21 (20.79)	12 (9.30)	21 (15.22)	54 (14.67)
5.	Herbal	39 (38.61)	30 (23.26)	24 (17.39)	93 (25.27)
6.	Others	8 (7.92)	5 (3.88)	1 (0.72)	14 (3.80)
Total		101 (100.00)	129 (100.00)	138 (100.00)	368 (100.00)

A look at the perceptions of different size categories of farm holders regarding their perception for planning expansion in area under various high value crops reveals that among both bottom and medium farm households a majority of 42 per cent and 53 per cent respectively have responded toward bringing additional land area under the production of various fruits while around 55 per cent households among upper size groups of farms are planning to initiate the cultivation of flowers followed by little over 36 per cent are planning to expand the area under the plantation of fruits. However, none of the household among upper size groups of farms of above two hectares has any intention to increase the cultivated land area under the vegetables and other food crops such as tea plantation and oilseeds. However, nearly one fourth proportion of households among tiny farm groups and over one third proportion of households among medium size categories of arms are planning to introduce the plantation of different herbal crops in their farming system.

Table 7.2 (e): **Perception of farm Households Planning For Expansion in Area under Various High Value Crops by size of Holdings**
(Holdings in hectares)

Sl.	Crops	No. of Households by Size of Holdings			
		Below 1.0	1.0 – 2.0	2.0 and Above	All Categories
1.	Fruits	129 (41.61)	25 (53.19)	4 (36.36)	158 (42.93)
2.	Vegetables	41 (13.23)	4 (8.51)	-	45 (12.23)
3.	Spices	56 (18.04)	9 (19.15)	3 (27.27)	68 (18.48)
4.	Flowers	40 (12.90)	8 (17.02)	8 (54.54)	54 (14.67)
5.	Herbal	75 (24.18)	17 (36.17)	1 (9.09)	93 (25.27)
6.	Others	12 (3.88)	2 (4.26)	-	14 (3.80)
Total		316 (100.00)	47 (100.00)	11 (100.00)	368 (100.00)

SHIFT IN AREA:

In the process of initiating agricultural diversification it is expected that on an average a farm household would be in a position to add another 0.12-hectare land area with the presently used area under the production of various high value crops. Though, per household addition of land under concerned crops would however, be varied to the extend of 0.09 hectares in high hill areas, where maximum proportion of land has already been put under the production various high value crops especially under fruit plantation, to 0.13 hectares in low hill areas and closely followed by 0.12 hectares in middle hill areas. Further, the area to be brought out under the production of fruits has been estimated as higher as 25.32 hectares with per households average of 0.16 hectares followed by 0.11 hectares under vegetables 0.09 hectares under each herbals and spices and lowest at 8.06 hectares under the plantation of other non food crops.

A cross different areas, in the total cropped area expected to be expended under the cultivation of various high value crops the proportionate area to be brought out under the fruit plantation has been viewed as higher as over 55 per cent in middle hill areas followed by nearly 54 per cent in low hill areas and lowest at 35 per cent in high hill areas. A second most priority would be provided in allocating additional land area under the plantation of herbals in both high and low hill areas and for spices in middle hill areas and for flowers in low hill areas. While the proportion of area to be allocated under the production of various off-season vegetables would be little over at 9 per cent in low hill areas followed by 7 per cent in high hill areas to lowest at 4 per cent in middle hill areas.

Table 7.3: Size of Land to be brought out under Different High Value Crops in Different Locations

(Land in hectares)

Sl. No.	Crops	Actual land to be brought out under high value crops by Locations				
		High Hills	Middle Hills	Low Hills	All areas	Average per Household
1.	Fruits %	4.81 (35.18)	9.89 (55.43)	11.34 (53.74)	25.32 (49.98)	0.16
2.	Vegetables %	0.82 (6.90)	0.66 (3.73)	2.00 (9.48)	3.48 (6.87)	0.08
3.	Spices %	1.36 (11.45)	3.28 (18.55)	1.70 (8.06)	6.34 (12.51)	0.09
4.	Flowers %	1.52 (12.79)	0.78 (4.41)	3.58 (16.97)	5.88 (11.61)	0.11
5.	Herbal %	3.58 (30.13)	2.60 (14.71)	1.88 (8.91)	8.06 (15.91)	0.09
6.	Others %	0.38 (3.20)	0.52 (2.94)	0.60 (2.84)	1.50 (2.96)	0.6
All Crops		11.88 (100.00)	17.68 (100.00)	21.1 (100.00)	50.66 (100.00)	0.12
Per Household Area		0.69	0.12	0.13	0.12	

Further, considering into account the size of land to be brought out under the proposed planning in initiating diversification of farming system by different farm groups of farm households, the analysis presented in table 7.3(a) postulates that the pattern of bringing expansion in area under various high value crops of farm households are largely determining by the availability of the size of cultivated lands with them. As the per household size of land to be added with the presently used land under the various high value crops would be as higher at 0.35 hectare for upper farm households followed by 0.20 hectares for medium farm households to lowest at 0.09 hectares for bottom size categories of farm households. Of the total expected size of land to be additionally brought out under the growing of high value crops, its share is expected would be highest for growing of fruits in case each of the size categories of farm holders, ranging highest at 53 per cent for medium farm holders to lowest at 47 per cent for upper farm holders. The upper farm holders are indicated to be providing second most importance in allocating the land under the floriculture while such is not in case of bottom and medium size of farm holders. The planning of these both the size of farm holders is to allocate second most share of over 17 per cent of additional land under the production of various herbals. Infact, only the bottom and medium size categories of farm holders have been planning to expand the areas under off-season vegetables and other non-food crops, especially under the plantation of tea.

**Table 7.3(a) Size of Land to be Brought Out under Different High Value Crops
by Different Size of Land Holders**

(Land in hectares)

Sl. No.	Crops	Actual land to be brought out under high value crops by size of farms				
		Below 1.0	1.0-2.0	2.00 and above	All areas	Average per Household
1.	Fruits %	16.08 (49.29)	6.94 (52.62)	2.3 (47.33)	25.32 (49.98)	0.17
2.	Vegetables %	2.9 (8.89)	0.58 (4.40)	-	3.48 (6.87)	0.08
3.	Spices %	4.18 (12.81)	1.3 (9.86)	0.86 (17.70)	6.34 (12.51)	0.09
4.	Flowers %	2.88 (8.83)	1.4 (10.62)	1.6 (32.92)	5.88 (11.61)	0.11
5.	Herbal %	5.64 (12.29)	2.32 (17.60)	0.1 (2.06)	8.06 (15.91)	0.09
6.	Others %	0.86 (2.64)	0.6 (0.46)	-	1.50 (2.96)	0.6
All Crops		32.62 (100.00)	13.18 (100.00)	4.86 (100.00)	50.66 (100.00)	0.12
Per Household		0.09	0.20	0.35	0.12	

EXPECTED COST OF EXPANSION:

Further, an estimation of average expected cost per hectare and per household during initial stages of growing various high value crops has been undertaken through enquiring among the farm households those are planning to initiate the diversification of their farming system. It may be noted that the concept of cost used here in concerned analysis includes only operating cost and the cost of land while the cost of family labour has been excluded. Initially, on an average a farm household will require an amount of Rs.6903 for initiating the cultivation of high value crops on the additional per household average land area of 0.12 hectares. However, the concern expected cost per household will vary to the extent of Rs. 8792 for the plantation of fruits to Rs.4076 for growing of spices. Per hectare initial cost of all high value crops together comes around Rs. 58.87 thousand though it has estimated as high as Rs. 71.07 thousand for other non-foodgrains followed by Rs.69.07 for the plantation of herbals, closely followed to Rs.69.06 thousand for herbals and lowest at Rs.43.72 thousand for spices followed by around Rs.54 thousand for each fruits and flowers.

In case of different geographical locations, the expected per hectare cost of growing of various high value crops together shall vary ranging between highest at Rs.67.51 thousand in high hill areas to lowest at Rs.54.81 thousand in middle hill areas and Rs.57.40 thousand in low hill areas. However, in terms of per household expected cost for such purpose shall vary on differentials manner among different locations due to a significant levels of differences emerging in the per household average size of land to be brought out under the production

various high value crops. It shall range highest at Rs.7.31 thousand in low hill areas to lowest at Rs.6.32 thousand in high hill areas and Rs.6.78 in middle hill areas. In high hill area the expected per hectare cost for growing of herbals has been reported to be highest at Rs.91.51 thousand followed by Rs.88.42 thousand for other non food crops, mainly the plantation of tea, and Rs.79.93 thousand for flowers and lowest at Rs.43.57 thousand for fruits. Again, per household requirement of finances to meet out the cost of growing herbals in hill areas has been estimated highest at Rs.8.40 thousand followed by Rs.6.79 for vegetables though it stands lowest at around Rs.4.2 thousand for both spices and other non-food crops.

Similarly, in both middle and low hill areas, per hectare cost of growing other non-food crops has been expected would be significantly much higher at Rs.73.08 thousand and Rs.58.33 thousand respectively as compared to remaining crops, though it would be lowest at Rs.21.66 for growing vegetables in middle hill areas and Rs.43.52 for growing spices in low hill areas. Further the analysis reveals that per household expected cost to be involved in plantation of fruits have been estimated significantly much higher in both middle and low hill areas as compare to other high value crops and lowest at Rs.3.13 thousand for growing of flowers in middle hill areas and Rs.3.64 for the plantation of herbals in low hill areas. Thus in the process of planning agricultural diversification, in addition to the identification of most leading and specialized crops to be grown more suitably in specific to different geographical locations, the cost structure involved in opting for growing of different high value crops should also be provided a high priority. Also initiating the plantation of various area based specialized fruits in high hill areas, growing of spices, especially of ginger in middle hill areas and together of spices and followers in low hill areas would be the most important options in the process for planning agricultural diversification.

Table-7.4: Per Household and Per Hectare Expected Initial Cost of Growing Different High Value Crops by Locations

Sl. No.	Crops	Cost in Rs.							
		High Hill		Middle Hills		Low Hills		All Areas	
		Per Hectare	Per Household	Per Hectare	Per Household	Per Hectare	Per Household	Per Hectare	Per Household
1.	Fruits	43565	5874	61582	10588	53219	8621	54862	8792
2.	Vegetables	57927	6786	21667	3383	58000	7625	57069	6506
3.	Spices	65956	4271	40854	4060	31471	3821	43722	4076
4.	Flowers	79934	5786	48077	3125	43520	7419	53537	5829
5.	Herbal	91508	8400	54481	4569	46489	3642	69063	5986
6.	Others	88421	4200	73077	7600	58333	3500	71067	7614
All Crops		67508	6315	54805	6776	57403	7306	58866	6903

REQUIREMENT OF EXTERNAL SUPPORT:

Further an analysis has been carried out in table 7.5 to present the kinds of external supports and assistances to be required to the farmers in the process of undergoing expansion in area under the production of various high value crops. Among the farming households those planning for initiating agricultural diversification a little over half of them have asked for providing financial assistance and in regards to the expansion of assured marketing facilities for selling their produced followed by 43 per cent for making easy access to the availability of plants and seeds, and less than 10 per cent farmers will require external assistances in matters related to testing of soils, technological knowledge for growing different crops and the expansion of storages and godown facilities for storing their produces. A little over 17 per cent farmers have also recommended for providing subsidy on the cost of transportation for carrying out different produced upto the various marketing centres.

Table 7.5: **Type of Assistance to be required for Initiating Agricultural Diversification by Locations**

Sl. No.	Crops	High Hills	Middle Hills	Low Hills	All areas
1.	Soil Testing	25 (24.75)	7 (5.43)	1 (0.74)	33 (8.96)
2.	Access to Plants/seeds	37 (36.63)	49 (37.98)	74 (53.62)	160 (43.48)
3.	Finance	86 (85.15)	61 (47.29)	37 (26.01)	184 (50.00)
4.	Subsidy on Transport	20 (19.80)	26 (20.15)	18 (13.04)	64 (17.39)
5.	Technical Knowledge to growing crops	4 (3.96)	-	4 (2.90)	8 (2.17)
6.	Irrigation Facilities	3 (2.97)	8 (13.95)	8 (5.80)	29 (7.88)
7.	Marketing Facilities	78 (77.23)	70 (54.26)	43 (31.16)	191 (51.90)
8.	Storage/Godown	6 (5.94)	8 (6.20)	1 (0.72)	15 (4.08)
Total Households		101 (100.00)	129 (100.00)	138 (100.00)	368 (100.00)

Among the farmers of different geographical locations, a overwhelming majority of over 85 per cent and 77 per cent farmers belonging to high hill areas have recommended for providing the faculties of finances and marketing for their produced respectively. Another around 37 per cent and 20 per cent farmers have also recommended for making easy access to required plants and seeds and the introduction of subsidy on the cost of transportation of goods on undertaking in its marketing respectively. In middle and low hill areas a majority of

farmers have also recommended for expansion of marketing network for their produced, easy access to the availability of various required plants and seeds and providing financial assistance in the process of undergoing the agricultural diversification.

In the case of various size categories of farm holders a majority of around 56 per cent farm households among those owing less than one hectare land will require the financial assistance as well as the facility of marketing for their produced in the process of taking initiatives for bringing additional land area under the production of various high value crops. Also around 42 per cent of farmers will require assistances in terms of getting plants and seeds of different crops, which they are planning to grow on their additional land area. Similarly, a little over 55 per cent and 45 per cent farmers among the medium and upper size categories of farm holdings respectively have also asked for making appropriate facility for obtaining various required plants and seeds. Another second majority of over one third proportion of farmers among both medium and upper size of farm have asked for extending the facilities of marketing for their produced and expanding the facility of storage and godown while none of the upper size category of farm holders is expected would require any external support in matter related to testing of soils, technological knowledge at the stages of growing various crops and additional irrigation facility.

Table 7.5(a): Type of Assistance to be required for Initiating Agricultural Diversification by Size of Holdings

Sl. No.	Type of Required Assistance	Number of Farmers by Size of Holdings (in hectares)			
		Below 1.0	1.0-2.0	2.00+	All areas
1.	Soil Testing	19 (6.13)	14 (29.79)	-	33 (8.97)
2.	Access to, Plants/seeds	129 (4.61)	26 (55.32)	5 (45.45)	160 (43.48)
3.	Finance	173 (55.81)	10 (21.28)	1 (9.09)	184 (50.00)
4.	Subsidy on Transport	58 (18.71)	4 (8.51)	2 (18.18)	64 (17.39)
5.	Technical Knowledge to growing crops	7 (2.26)	1 (2.13)	-	8 (2.17)
6.	Irrigation Facilities	27 (8.71)	2 (4.26)	-	29 (7.88)
7.	Marketing Facilities	172 (55.48)	16 (34.04)	3 (27.27)	191 (51.90)
8.	Storage/Godown	5 (1.61)	6 (12.77)	4 (36.36)	15 (4.08)
Total Households		310 (100.00)	47 (100.00)	11 (100.00)	368 (100.00)

REASONS FOR LACKING INITIATIVES IN AGRICULTURAL DIVERSIFICATION:

The analysis undertaken in preceding part was based on 368 farm households those were actually intended to undertake initiatives for agricultural diversification through expanding land area under the presently grown various high value crops as well as through introduction of additional high value crops in their farming system. Now, the study further attempts to examine and try to bring into notice about the reasons and factors which are responsible behind the lacking interest of remaining 606 farm households in opting for agricultural diversification, in spite of the fact that their follows farmers in the same villages have been already involved in growing certain high value crops and are still taking additional initiatives to expand the land area under these crops and through introducing some new crops in their farming system.

Availability of limited cultivated land area, lacking initiatives from the part of different Government Departments to motivate farmers for opting to grow high value crops and lacking marketing facilities for selling the farm produced have been visualized as the prominent constraints behind a very high proportion of over 62 per cent farm households, comprising a fairly highest proportion of around 70 per cent in high hill areas followed by 59 per cent in middle hill areas and 58 per cent in low hill areas are still involved in using their cultivated land

Table 7.6: Reasons of Farm Households for Not Initiating Agricultural Diversification in Different Locations

Sl.No.	Reasons	No. of Households by Locations			
		High Hills	Middle Hills	Low Hills	Total
1.	High Production Cost	98 (42.24)	52 (28.11)	82 (43.39)	232 (38.28)
2.	Lack of Awareness	28 (12.07)	34 (18.38)	31 (16.40)	93 (15.75)
3.	Scarcity of Land	210 (90.52)	116 (62.70)	85 (44.97)	401 (66.17)
4.	Marketing Problems	151 (65.09)	136 (73.51)	122 (64.55)	409 (67.49)
5.	Non availability of seeds, plants	82 (35.34)	83 (44.86)	64 (33.86)	229 (37.79)
6.	High Cost of Production	51 (21.98)	77 (41.62)	100 (52.91)	228 (37.62)
7.	Lack of Finances	49 (21.12)	46 (24.86)	56 (29.63)	151 (24.92)
8.	Lacking Motivation from the Government	150 (64.66)	145 (78.38)	126 (66.67)	421 (69.47)
9.	Lacking Irrigation	161 (69.40)	47 (25.41)	29 (15.24)	237 (39.11)
10.	Lacking Cold Storage, Godown	38 (16.38)	8 (4.32)	15 (7.94)	61 (10.07)
	Total	232 (100.00)	185 (100.00)	189 (100.00)	606 (100.00)

under the production of various low value foodgrains crops and are no way making any planning for opting in undertaking shift of any part of their land under the production of any high value crops. Involvement of high production cost in response to growing various high value crops, lacking availability of improved variety seeds and plants of required crops and the facility of irrigation etc. have been noted another important elements which are limiting the scope of around one third proportion of farm households in opting to undertake changes their farming system by way of growing various high value crops.

Among different geographical locations, the scarcity of arable land area has been indicated as the prime factor for overwhelming majority of 91 per cent farm households in high hill areas followed by 63 per cent households in middle hill areas. However in low hill areas lacking initiative from the part of Government and the problems of marketing for the disposal of various farm produces have cited as the most important factors which restricting to over three fourth proportions of farm households for undertaking agricultural diversification. In fact over three fourth proportions of farm households each in both middle and high hill areas have also cited that the underdeveloped marketing facilities have been limiting their scope to opt for growing high value crops.

As far as incorporating the reasons of different size categories of farm holders behind their lacking involvement towards undertaking shift in land area under the production of various high value crops the analysis has been presented in table 7.6(a).

Table 7.6(a): Reasons of Farm Households for Not Initiating Agricultural Diversification By Size of Holdings

(Size of Holdings in hectare)

Sl. No.	Reasons	No. of Households by Size of Holdings			
		Below 1 hectare	1-2 hectare	2 and above	Total
1.	High Production Cost	207 (89.22)	25 (13.51)	-	232 (38.28)
2.	Lack of Awareness	45 (19.40)	37 (20.00)	11 (5.82)	93 (15.75)
3.	Scarcity of Land	229 (98.79)	172 (92.97)	-	401 (66.17)
4.	Marketing Problems	215 (92.67)	159 (85.95)	35 (18.52)	409 (67.49)
5.	Non availability of seeds, and plants	109 (46.98)	88 (87.57)	32 (16.93)	229 (37.79)
6.	High Cost of Production	193 (83.19)	23 (12.43)	12 (6.35)	228 (37.62)
7.	Lack of Finances	142 (61.21)	7 (3.78)	2 (1.06)	151 (24.92)
8.	Lacking Motivation from the Government	164 (70.69)	146 (78.92)	111 (58.73)	421 (69.47)
9.	Lacking Irrigation Facilities	178 (76.72)	38 (20.54)	21 (11.11)	237 (39.11)
10.	Lacking Cold Storage, Godown	54 (73.28)	5 (2.70)	2 (1.06)	61 (10.07)
	Total	232 (100.00)	185 (100.00)	189 (100.00)	606 (100.00)

It seems that availability of limited size of cultivated land area in case of both tiny and medium size of land holders and lacking motivations from the part of different Government Departments in the form of initiating any development programmes so as to maximize the participation in case of upper farm holders have been noted as the prominent constraints in shifting land areas under the productive various high value crops. Similarly, the factors such as inadequately developed marketing facilities, involvement of a comparatively high production cost and lacking irrigation facilities altogether have also been limiting the scope of over three fourth proportion of bottom and medium size of farm holders for opting the cultivation of high value crops. In fact a very high proportion of around 88 per cent medium size of farm holders complained that lacking of improved variety seeds and plants have been restricting them to go for agricultural diversification. However, any of the upper size categories of farm holders have the understanding that scarcity in the size of land and the involvement of high production cost have been restricting them for undertaking concerned initiatives.

Thus, it has been well recognized that the farm households in different sample areas, irrespective of the size of land holding they owned, are highly aware about the advantages of using their available land under the production of various high value and market oriented crops instead of traditional food-grain crops in different areas. Infact a overwhelming majority of farmers among those are presently involved in growing of particular crops and are also engaged in generation of sufficient quantum of marketable surplus were initially motivated in favour of growing these crops by these favorable advantages. Even presently, a remarkable proportion of farm households are very keenly interested in planning for initiating expansion in land area under the production of various high value crops through reducing area under the production of traditional food grains. Again the perceptions of deriving relatively higher per hectare returns and more suitability of land for using it under the production of various area specific niche based commercial crops as compared to foodgrains have been largely motivating to the farmers for taking concerned initiatives. In the near future, the increasing proportion of farm households are expected will certainly maximize per hectare returns through allocation of their land under the available most economically beneficial options of growing fruits, herbals, spices and various off-season vegetables.

However a significant proportion of farm households are still hesitating in diverting their available land under the production of various high value crops due to the well recognized problems of lacking marketing facilities for selling these produced and comparatively much larger cost of production involved in case of growing concerned crops as compared to various foodgrains and several other factors. Even it is believed that providing greater initiatives towards minimising the cost structure of production, developing basic infrastructural facilities and motivating farmers to undertake changes in cropping pattern through providing certain incentives could possibly be a instrumental approach to maximize the participation of farmers in

using of available land under certain market oriented high value crops. As the lacking initiatives from the part of Government Departments in motivating farming communities to bring changes in cropping pattern have been highly recognised in each of the geographical locations.

MEASURES FOR MEETING THE OPPORTUNITY COST OF SHIFTING LAND:

The emerging poor economic status of a majority of farm households has also been universally well recognised restricting them for initiating expansion in land area under various high value crops, especially under the plantation of various fruit trees. The well-visualized common facts are that the fruit trees require four to six years to develop before they can bear fruits and provide income. Therefore, the shift from the production of food-grains to the plantation of fruits would initially mean hardship for farmers, particularly those owning very small pieces of land. In this context providing financial assistance equivalent to the amount of output the farmers loose through shifting their land towards the growing of fruits could be a most effective instrumental measure for achieving increasing land area under the plantation of various fruits. In addition to this the farmers could also be awared for undertaking inter-cropping under the area, which is used for growing of fruits so as to meet out the opportunity cost of shifting land to a certain proportion.

INTERCROPPING:

In fact, presently around 30 per cent of the farming households, comprising fairly highest proportion of around 46 per cent in high hill areas followed by 23 per cent in low hill areas and a little over 9 pr cent in middle hill areas are even practicing to undertake intercropping in the fruit grown areas. And the proportion of fruit area brought out under the inter-cropping of various crops, accounted to the extent of over 35 per cent, though the corresponding proportion has been estimated highest at over 51 per cent in low hill areas and approximately 32 per cent each in case of high and middle hill areas. Considering into the analysis presented in table 7.7 it seems that the inter cropping in the fruit grown area is possible in each of the geographical locations. But it would be more appropriate to identify various suitable high value commercial crops which can provide maximum returns in specific to particular areas and then the farmers should be awared and Informed to use such Identified crops for undertaking inter cropping on their farms. A study by Karana (1996) showed that raising Soyabeans during the Kharif season and peas in the rabi season successfully

Table 7.7: **Pattern of Inter-cropping in Different Locations**

Sl. No.	Description	High Hills	Middle Hills	Low Hills	All areas
1.	Fruits Growing Household	247 (100.00)	160 (100.00)	125 (100.00)	532 (100.00)
2.	Households engaged in inter-cropping % of fruit growing households	113 (45.75)	15 (9.37)	29 (23.20)	159 (29.51)
3.	Area under fruits (hectare)	69.15 (100.00)	3.64 (100.00)	13.06 (100.00)	85.85 (100.00)
4.	Area under inter-cropping (hectares) % of fruit area	22.37 (32.25)	1.15 (31.59)	6.71 (51.38)	30.23 (35.21)

complemented various fruit trees, especially pecan nut trees. Another study by Mehta (1996) also shows that inter-cropping between fruit trees with oilseeds and local varieties of pulses has been quite successful, over a period of four to five years in most orchards in Nainital and Almora. Infact the value of pulses and oilseeds from inter cropping is estimated to be much higher than the value of traditional crops grown on the same land.

Table 7.8: **Differences Existing in Per Hectare Gross Income under Inter-cropping and without Inter-cropping of Different Crops in Different Locations**

Sl. No.	Crops Used Under Inter-cropping	Per Hectare Gross Income in Rs.							
		High Hill		Middle Hills		Low Hills		All Areas	
		Under Intercropping	Without Intercropping	Under Intercropping	Without Intercropping	Under Intercropping	Without Intercropping	Under Intercropping	Without Intercropping
1.	Cereals	2147 (51.00)	4210 (100.00)	-	5498	3754 (37.39)	10040 (100.00)	3320 (49.64)	6688 (100.00)
2.	Pulses	4792 (39.01)	12285 (100.00)	-	13952	18613 (86.60)	21493 (100.00)	5556 (27.88)	19925 (100.00)
3.	Oilseeds	5322 (48.00)	11088 (100.00)	2018 (11.92)	16924 (100.00)	7975 (39.27)	20307 (100.00)	6937 (39.37)	17621 (100.00)
4.	Vegetables	3095 (14.93)	20736 (100.00)	16311 (81.59)	19992 (100.00)	19243 (97.38)	19760 (100.00)	6244 (30.82)	20261 (100.00)
5.	Spices	-	55550 (100.00)	7588 (7.38)	1027785 (100.00)	2923 (6.03)	48475 (100.00)	4167 (4.45)	93595 (100.00)
6.	All Crops	3118 (19.48)	16004 (100.00)	8247 (50.50)	16332 (100.00)	12088 (90.27)	13395 (100.00)	5304 (34.24)	15492 (100.00)

Considering our analysis related to the pattern of inter-cropping as presented in table 7.8 reveals that the inter-cropping in between the fruit grown areas could be successfully performed by growing various cereals, pulses, oilseeds, vegetables and spices. However, per hectare value of output that could be generated through inter-cropping has been estimated highest at Rs.6.94 thousand through growing oilseeds followed by Rs.6.24 thousand through vegetables and lowest at Rs.3.32 thousand through cereals. The aggregate losses on the production of agricultural crops as a result of plantation fruit trees in sample areas constituted to around 65.76 per cent though the corresponding losses has been estimated to the extent of only a little over 9 per cent in low hill areas followed by 49 per cent in middle hill areas while it revealed a very larger proportion of 81 per cent in high hill areas. Further, based on the differences emerging in per hectare productivity of various crops while they are grown under intercropping with the plantation of fruits and the same were earlier grown independently it may strongly be recommended that growing of various oilseeds, especially Soyabean in high hill areas, and off-seasonal vegetables in both middle and low hill areas under the farming system of inter-cropping in between the fruit trees would be economically most important options. In addition inter cropping of various cereals, especially madua in high hill areas and pulses in low hill areas would be a second most alternative and economically beneficial option.

CHAPTER- VIII

CONCLUSIONS AND POLICY RECOMMENDATIONS:

The agricultural activities have continued to play a dominating role in providing gainful employment opportunities to the labourforce and in generation of income for sustaining livelihood of the households in rural areas for the last several centuries. However, due to factors such as increasing fragmentation of land holdings, ever declining rate of land-man ratio, widening inequalities in the distribution of arable land for cultivation among the farm households and increasing application of labour saving farm production technologies over the years, the agriculture sector has not been in a position to create additional employment opportunities for increasing labour force or to sufficiently meet out the emerging challenges of livelihood problems of rural households even in the agriculturally potential and developed regions. The situation has become even more acute in the hilly and mountain areas where almost all the farm households fall in the category of marginal households as a result of their small size, infertility and since they are mainly unirrigated.

The focus of the present study has been to investigate into the extent and nature of options that are presently available in the hilly and mountain areas of Uttaranchal for improving the livelihood situation of marginal farmers and to create additional productive employment opportunities on a sustained basis within the rural area itself. In this regards, the study has attempted to examine the distribution pattern of arable land among different farming communities; emerging changes in cropping pattern; Socio-economic characteristics of marginal farms and the farming households; differences prevailing in per hectare production, productivity, cost of production, gross and net value of returns and employment generation in using available land under different cropping system and the accessibility to various improved agricultural technologies and infrastructure facilities, including the marketing facility. In addition the study also examines into the kinds of constraints restricting to and factor motivating farmers for using their available land under most profitable options i.e. growing of area specific niche based different high value crops; type and extent of external measures to be required for

motivating farmers for initiating crop diversification and the future planning and perceptions of different farm households in this regards across various locations of the state. The study is based on both secondary as well as primary data. The primary data has been collected from a sample of 974 farm households selected from different locations, i.e. high, middle and low hill areas, representing both Garhwal and Kumaun regions of Uttaranchal.

The state, largely dominated by hilly and mountain areas continued to remain one of the most underdeveloped states in India. Most people in the state depend upon agriculture for their livelihood and employment. Land ownership here is not only a symbol of economic status but of social status as well. Shrinking cropland as a consequence of unrelenting demographic pressure, increasing urbanisation and sub-division of holdings is endangering their food and livelihood security. Although a population of about 85 lakhs inhabiting an area of 53.5 thousand sq. kms. in the state gives an overall population density of about 159 per persons as against 324 persons at national level, the actual pressure on sloppy hills is better indicated by the number of people per hectare of cropped land, a figure that constitute much higher. Per capita cropped land in the state stands only 0.09 hectares, which in fact, has been considerably declining over the years. In addition, over 90 per cent of cropped land is lacking the facility of irrigation. Hence the fertility and productivity of land have been adversely affected partly due to the lack of irrigation facility and partly due to increasing depletion of various natural resources supporting to agriculture during the recent past. The net result of this has been recognized in terms of increasing marginality of available land and livelihood insecurity of marginal farm households. On the whole, dominance of agriculture sector has been losing its ground in terms of both providing gainful employment and income for rural households in the recent past.

In this light, undertaking certain initiatives to maximize per hectare income to be generated from concerned marginal farms and thus to strengthen the productivity per worker and livelihood of marginal farmers have been a rather challenging task in the perspectives of hilly areas of the State. Considering into account the various environmental constraints imposing towards initiating a large scale economic diversification only a most important option in this context lies on undertaking crop diversification through using of available cropped land under the production of certain specialize high value crops instead of using it under the production of traditional food crops.

As the available typical climatic and varied soils conditions and topographic features in different parts of the state are naturally providing a greater advantages to the farmers to use their available small size of marginal lands in growing different high value crops specially off-

season vegetables, fruits, spices etc. so as to maximize per hectare incomes instead of using it under the traditional crops. Keeping these facts into consideration the present study highlights the possibility of bringing improvements in livelihood situation of marginal farm households and the extent of which the productive employment opportunities can be created through changing the cropping pattern in different geographical locations of the State.

MARGINALITY OF FARMS AND THE MARGINAL FARMERS:

In defining marginal farms the quality of land and its basic characteristics have generally been ignored while the farm size below one hectare have been put under the category of marginal farms and the farmers owning less than one hectare of land are considered as the marginal farmers. However, considering various characteristic of land as indicated in chapter two the present study categorized every size categories of farm holders as the marginal farmers. In the State, average size of farm constituted to 0.92 hectares and a very high majority of over 91 per cent farms are confined in the categories of below 1 hectare. The larger size of farm holdings of above 2 hectares are mainly confined in low hill areas. In real sense per household actual land area used for cultivation works out to 0.46 hectares. The per household land area being left uncultivated and kept it as fallow accounted to 0.41 hectare. Lacking irrigation facility coupled with declining fertility of land in almost all the hilly parts of the state, especially in high hill areas, may be attributed as the prime reasons behind increasingly higher area as fallow or uncultivated. Such pattern of under utilization of arable land during different crop seasons has been further enforcing the situation of increasing marginal nature of farming system in the state.

Despite the fact that per household arable land in almost all the locations is very scared every farm households owned at least some piece of cultivated land and it is continued to be their important source of livelihood and employment. However, undertaking farming neither provides sustainable livelihood or the gainful employment opportunities. Therefore, the available labourforce in farm households have been largely depending upon non-farm activities both for employment and income generation. Even the various non-farm occupations provide very low amount of income to the labourforce. As a consequence they are forced to move into a number of occupations so as to maximize their households income. The working age group population in marginal farm households is hardly found unemployed due to economic compulsions of their poor households. As the rate of un-employment among this vulnerable group stands only less than one percent points, though it has been consistently related with the size categories of farms. The dependency ratio of non-working population over their working

population is also very low at 2 per cent in almost the geographical locations, but the work participation rate among women stands relatively much higher as compared to men.

Despite the fact that the marginal farm households are economically very poor they are highly aware in availing education. Since the proportion of literate people in these households has been recorded as high as around 75 per cent and it reaches to the extent of over 78 per cent in high hills. However, the proportions of literate women are far behind to their men counterpart in all the geographical locations. Also the literacy rates of both men and women and the proportion of population in different locations possessing higher level of education are positively related to their farm groups.

As far as the structure of employment is concerned, the labourforce in different geographical locations has been largely concentrated in agriculture and its associated activities, though the respective concentration ratio has been estimated significantly much larger in case of women labourforce than the men labourforce but the proportion of labourforce engaged in non-farm activities has been negatively related with the size groups of farms. The service sector is seen, as the second most important source of employment after farm sector, which is engaging around 10 per cent of labourforce; though its contribution is largely, confined in low hill areas.

In terms of pattern of income generation from different sources is concerned all the farm households are deriving income from more than two sources while the per household average number of income generation sources account to around 4 which are marginally higher for households with bottom size groups of farms and those are located in middle hill areas. Animal husbandry seems to be the most important source of income for around 84 per cent households are engaged in it. The next in importance are growing fruits and vegetable in which 76 and 37 per cent households are engaged. The proportions of households generating income from animal husbandry are invariably positively related with their size of farms. Another important source of income generation of over 44 per cent households is the wage-paid-employment.

The economic condition of farm households has been largely determined by the size of land holdings. Also the households possessing relatively larger size of holdings have the greater advantages an wide ranging options than the smaller holders of land in terms to allocating their available land under various options which can maximize per hectare incomes. The contribution of income generated from farm sector in the total income of upper farm groups of households is higher as over 62 per cent as against 40 per cent for medium and merely 17 per cent for

bottom farm households. The bottom and medium groups of farm households are seen largely depending on wage-paid-employment available, mainly in construction activities, for maintaining their livelihood while hardly any family members from upper farm groups adopt wage-paid employment.

Despite the fact that marginal farm households have been generating very low amount of per household income from farm activities but a very high majority of over three fourth proportion of them are in a position to generate at least some amount of savings from the income they generate from undertaking non-farm activities. But every household among upper farm groups is having at least some amount of saving after meeting their household expenses. Annual savings per household accounted for Rs.18.6 thousand which stands lowest at Rs.16.92 thousand for bottom farm groups to highest at Rs.31.8 thousand for upper farm groups. Over and above the amount of income being generated together from farming and animal husbandry has been found to be sufficient to sustain the livelihood of upper farm households, especially those are located in low hill areas. However the livelihood of households owning below 2 hectare size of farms can not be sustained unless their participation in non-farm sector has to be maximized. In all only 16 per cent farm households are not in a position to maintained their livelihood from the available income they generate from different sources. Hence they are forced to borrow on an average of Rs.4.40 thousand annually while 6 per cent households find their available income just sufficient for maintaining their livelihood and remaining 78 per cent households are generating surplus income. The indebted households have been borrowing money largely from commercial Banks and Co-operative Societies, especially for purposes like the purchase of animals and agricultural inputs.

The housing conditions, in terms of the size structure of accommodation, quality of houses and the availability pattern of various facilities in the houses of farm households are largely determining by the size of land area the concerned households are possessing. However, a majority of households have constructed pucca houses with around 3 rooms but a large proportions of households do not have the facilities of separate kitchen and bathroom. The facility of electricity connection was found in the houses of over 64 per cent farmers; though the proportion of such households is as high as 87 per cent in low hill areas and only 37 per cent in high hill areas. As far as the availability of drinking water facility is concerned the common sources for obtaining drinking water are the public taps (locally known as dharas). The dharas and ponds together are the sources of obtaining drinking water for over 72 per cent households while a majority of (77 per cent) households have to cover less than one kms for this purpose.

In all the marginal farmers in Uttaranchal are maintaining a fairly reasonable living standard if we take into account the quality, condition and availability of different infrastructures facilities available in their houses and overall amenities of life which they are enjoying as compared to their counterpart farmers in most of other states. This is mainly by virtue of their household expenses being supplemented from a larger amount of income being generated from non-farm activities, animal husbandry and remittances from the migrant family members. Per household annual consumption expenditure has also been estimated to be fairly high at Rs.36.64 thousand with a minor differences prevailing among different geographical locations (Rs.64.51 thousand for upper farm groups to the lowest at Rs.34.6 thousand for bottom farm groups of households). In fact the annual per capita consumption expenditure worked out to be Rs.6.44 thousand, which ranges to the highest level of Rs.9.1 thousand for upper farm groups to lowest at Rs.6.2 thousand for bottom farm groups of households. However, average expenditure on the purchase of non-food items has been revealed fairly much higher as compared to food items in case of all farm groups of households in different areas. On an average the farm households are in a position to generate only 22.77 per cent of their consumption requirement from their available farms and the share ranges from a low of 18 per cent to highest at 27 per cent for bottom and upper farm groups of households respectively.

STRUCTURE OF ANIMAL HUSBANDRY :

Animal Husbandry is regarded as an integral part of farming system in hilly areas because of its importance in providing milk and milk products, meeting the fertilizer demands for farming, use of bollucks for ploughing and the use of certain animals as the main means of transport. In addition, the significance of crop mixed animal husbandry should also be considered as the crucial alternative option for improving the livelihood situation of mountain marginal farm households in the sense that these areas are lacking adequate arable land and even in a situation of maximizing the use of available land under the cultivation of various area specific niche based high value crops is expected will hardly be sufficient to sustain the livelihood of farm households.

Animal husbandry has been recognized as the second most important source of income after the generation of income from various non-farm activities, in different geographical locations. However, the population of most livestock, especially draft buffaloes, milk cows, bullocks and young cattle have been considerably declining during the recent past. Though the population of milch buffaloes, sheep, goat, young buffaloes and other animals such as donkeys,

horses and mules which are used for transport purposes have been significantly increasing. It seems that the farm households have been more concerned to maintain milch buffaloes rather than milch cows as the former animals provide higher quantity of milk as compared to latter one. Despite the fact that per animal maintenance cost averages to be almost similar for both buffaloes and cows. Also the value of cows for production of bullocks as drought animals is declining due to decreasing size of land holdings, rendering the maintenance of bullocks for drought purposes un-economical. An overwhelming increasing trend as reflecting in the population of sheep in different locations, especially in high and middle hill areas could be attributed the result of successful implementation of Intensive Sheep Development Project which was introduced by the State Government in 1976. The continued accessibility problems in most part of the hills have attributed the increase in population of donkeys, mules and horses.

However, despite a considerable declining trend revealed in the growth of cattle during the recent past the population of cattle to total livestock's population is still largely dominating in each geographical locations while the rearing of goats and sheep is being largely undertaken in high hill areas. In fact the horses, donkeys and mules are also largely maintained in high hill areas where they are only used for transport purposes.

Taking into account the structure of production of different livestock products it revealed that the production of milk has been the most important product in each of the locations which in fact, has been growing at the rate of 16 per cent annually. However, the milk production from cow is increasing at the rate of only nearly 4 percent as against 22 per cent from buffaloes. The aggregate value of production being achieved from animal husbandry has also been consistently increasing to a fairly significant level in each of the geographical locations, ranging lowest at 13 per cent in middle hill areas to highest at 17 per cent in high hill areas.

Generally, various livestock produce, especially milk and other milk products were usually consumed by the farm households themselves while any surplus is sold out within their villages to the other farm households. However, over the years, the traditional concept of maintaining livestock is undergoing a change and economic considerations are playing a significant role because animal husbandry is an important source of additional income of these households, especially for households owning very little size of land for cultivation. On an average, per household annual consumption and sale of livestock products valued to Rs.4288 and Rs.4723 respectively. Both the value of sale as well as consumption of various livestock produces have been considerably moving up in all the geographical locations, but largely in case

of relatively higher size groups of farm households. However, the sale of all livestock produced together has been increasing to a highest level of 19 per cent in low hill areas to a lowest range of 15 per cent in middle hill areas. In fact each size category of farm households have achieved a unprecedented success in boosting up the overall livestock production, especially milk production and it has not only increased their consumption pattern but their economic conditions have also improved simultaneously through selling of over 52 per cent of the surplus livestock products.

Animal Husbandry does not require very high maintenance cost because the fodder is largely obtained from the nearby forests and common lands of the village communities free of cost. As a result of the easy access to free fodder and higher participation of family labourforce in looking after their animals, per animal annual maintenance cost works out to be only Rs.545. Among the different items of expenditure involved in looking after the animals, the procurement of fodder alongwith foodgrains for feeding animals constitute the two major heads of cost of maintenance in each locations in which per animal cost has been estimated to Rs.257 and Rs.192 respectively.

Both value of gross output and net returns from undertaking animal husbandry have been consistently increasing but its pattern is varying to a certain level among different locations and according to the size of land holdings of the farmers. In comparison to cost of maintenance involved in animal husbandry the amount of net returns being derived by farming households in different areas seems to be fairly high. Per unit cost of output works out to be as high as 3.81, consisting 4.60 in middle hill areas, 4.38 in low and 3.12 in high hill areas. The employment elasticity of animal husbandry also noted to be quite significant in the sense that it has been gainfully engaging over half of the family labourforce of farm households with a certain differences existing in the nature and extent of employment in different areas. Also the per worker productivity in maintaining livestock has been reported two folds higher as compared to the productivity of workers in farm sector.

EMERGING CHANGES IN CROPPING PATTERN, PRODUCTION AND PRODUCTIVITY:

Extent of differences exiting in geographical, agro-climatic, soil characteristics, rainfall and water availability for irrigation as regional level, among the districts, and even among different watersheds and geographical locations within a district have been largely contributing to the differential characteristics of cropping pattern. The farmers have been mainly adopting

the practices of utilizing their available limited arable lands mainly for growing traditional crops. However, over the years the farmers in different areas have started making the use of certain area specific advantages and opportunities as provided by the nature for growing certain high value and market oriented crops. They have been increasingly shifting their available land under the production of various non-food crops, especially fruits, vegetables, spices etc. through reducing it under the traditional food crops. But despite a 1 per cent annual declining trend revealed in area under the production of food-grains its share continued to be very high at 70 per cent as against the share of 14 per cent and 8 per cent respectively for fruits and other non-food crops in the gross cropped area. In fact the proportion of area being used for growing food grains has been negatively related with the size categories of farms. The rice and wheat are the most dominating food crops grown in almost the geographical locations, but the area under both the crops have been narrowing down at the rate of 1.76 per cent and 0.14 per cent annually.

Over and above the reduction in land area under the production of food grains have been taking place at the rate of 1.22 per cent annually while the allocation of land under the production of fruits, vegetables and spices have been increasing at the rate of 2 per cent, 5 per cent and 4 per cent respectively. In each of the geographical locations, the farmers have been increasingly keen to divert their lands largely under the production of off-season vegetables followed by spices as compared to the plantation of fruit trees because the extent of risk involved on the production of fruits from various natural calamities are fairly at higher level as compared in opting the production of spices and vegetables. Even than the proportion of land area allocated under the plantation of fruits is already much higher than under the remaining high value crops in each of the geographical locations. However, the proportion of cropped area under the production of all high value crops together has been consistently declining with the every increase of the size of holdings.

The high hills areas have been possessing greater advantages and opportunities over the low and middle hill areas in terms of growing various temperate, tropical and sub-tropical fruits throughout the year. Certain fruits, which can be successfully grown in former areas the same can not be grown in latter areas due to certain variations, exist in temperature and agro-climatic conditions. It is therefore, the fruit area in high hills has been noted many folds higher than the case of middle and low hill areas. Mango, and litchi are the two important fruits grown in low and middle hill areas while apple and peaches are the dominating fruits in high hill areas for the past several centuries. But the area under apple has been consistently narrowing down while it has been subsequently increasing under the production of peaches and plums. Similarly, the

area under mango has also been declining while it has been increasing under litchi in middle hill areas but in low hill areas the cropped area under both the crops is on the increase.

Potato seems to be the dominant crops among the various vegetables grown in different areas. The proportion of area being put under the production of potato to gross cropped area of vegetables accounts for over 63 per cent; which is even as high as 81 per cent in high hill areas and also subsequently increasing among different size groups of farms in each of the geographical locations. Other main vegetables grown in the state comprises of onion, tomato, cabbage and arum. However, the area under tomato, cabbage and arum in middle and high hill areas and for onion and arum in low hill areas has shown a declining trend.

The quantum of production of almost all the cereals has also shown a declining trend but relatively at lower level as compared to the extent of cropped area has been declining in almost the locations, especially in high and middle hill areas and in case of bottom size groups of farms during the recent past. However, the production of peas and gram has been growing to a appreciable manner in almost the areas but to a highest level in high hill areas followed by middle and low hill areas while it has been considerably declining for masoor in all the areas, and local pulses like bhatt, gahat and soyabean in low hill areas. The bottom and medium farm groups of households are visualized taking increasing initiatives to boost up the production of peas and gram while the upper farm groups of households are largely concentrated to increase the production of local pulses.

The Soyabean and mustard are the main oilseeds grown in the state and their annual production has been increasing at the rate of 1.91 per cent and 2.89 per cent respectively, but the size of production of soyabean has shown a declining trend in high and low hill areas and also in case of medium and upper size groups farms. Lahi and mustard are the other oilseeds grown in each of the geographical locations. However, over the years, the size of production of both the crops have been narrowing down in middle hill areas with a marginal increasing trend revealed in low and high hill areas. Growing of various spices according to the requirement of farming households has also been an old tradition in almost the areas. But a majority of farmers have initiated to concentrate for increasing the size of production of spices like chillies, ginger and garlic for the purpose of its disposal in the market. Almost the farmers, irrespective of the size of land they have been possessing, are involved in growing spices, and the overall size of production of species have been picking up at a remarkable level.

In terms of the production structure of different fruits it is found that irrespective of decreasing trend revealed in the area under apple the size of its production has been going up at a substantial rate of nearly one per cent points. Even the concerned trend is noted to be as

high as over 3 per cent in middle hill areas. Similarly, the size of production of remaining fruits such as apricots, peas, nuts, walnut which are grown in high hill areas and mango and litchi which are grown in low and middle hill areas has also been growing up considerably. Over and above, the farmers in high hill areas have been largely specializing in growing of peaches and peas while the farmers in middle and low hill areas have been largely involved in the plantation of litchi, mango and papaya which cannot be grown in high hill areas. Also the size of production of fruits has been consistently increasing across the different size categories of farms, but at a highest level in medium size of farms while in bottom farms the growth trend has been picking up at highest level of 11 per cent for litchi followed by 9 per cent for both peaches and peas. Specialization of medium farm households has been further strengthening in producing plums and peaches for upper farm groups.

Like in terms of the share of area, the share of production of potato has also been indicated fairly at highest level in the total quantum of vegetable production in each size groups of farm households in each location. Though its share varied between 81 per cent and 44 per cent respectively in high and middle hill areas. Onion seems to be the second most vegetable grown in middle and low hill areas. On the whole the growth trend has been picking up at a highest level for tomato in low hills, and onion in both high and middle hill areas during the recent past. Over and above, growing of rainy seasonal vegetables, including of tomato has been receiving an increasing importance over the years in upper and medium farm groups while the farmers with tiny size of farms of below 1 hectare have been providing increasing attention on growing of onion followed by tomato, as the annual growth trend in the production of concerned vegetables accounted 12.32 per cent and 8.13 per cent respectively.

As far as the productivity structure of various food and non-food crops is concerned it is observed that despite a considerable declining trend witnessed in the area under different food crops and certain non-food crops, the productivity of major food crops, excepting rice, madua and barley in middle hill areas, and non-food crops, excepting vegetables in middle hill areas have been increasing in the State. Per hectare productivity of all crops together is showing an increase of 2.22 per cent. Also the productivity of food-grains is showing a positive growth rate of 0.31 per cent. A most striking feature which emerges is that despite a significant level of declining trend revealed in the productivity of madua over the years the farmers have been increasingly diverting their land under the production of concerned crop. Contrary to this despite very high productivity rates as being derived in case of barley the different size groups of farmers in almost the locations have started reducing the area under barley. Per hectare productivity rates of all crops together are found significantly highest at 62 qtls. in low hill areas followed by 40 qtls. in middle and lowest at 27 qtls. in high hill areas. However, excepting the

case of oilseeds and non-food crops such as tobacco and sugarcane the productivity per hectare of remaining high value crops is found to be higher in high hill areas as compared to middle and low hill areas. The high hill areas are deriving certain advantages and benefits in terms of achieving larger per hectare production in favour of growing spices followed by vegetables and fruits and least for growing oilseeds; while the low hill areas have the advantages over other areas in growing of oilseeds and other non-food crops like sugarcane, turmeric and tobacco. In middle hill areas, the most favourable advantages are noted in opting for growing spices followed by vegetables.

Moreover, per hectare productivity of almost the foodgrains and high value crops constituted fairly much larger in favour of bottom farm groups as compared to relatively larger farm groups, only exception is that the productivity of oilseeds has been estimated relatively higher in upper farms than in remaining farm groups. In this sense the farmers with tiny size of holdings with below one hectare have been better optimizing the use of their available size of land through using it under different high value crops. Still, a considerable extent of opportunities are still available to enhance and achieve higher per hectare productivity in favour of growing various high value crops for each size groups of farm holders, especially tiny farmers. As in presently emerging situation the productivity of all high value crops has been consistently increasing to a significant level across different farm groups. Thus the facts which emerge strongly are that the options for initiating agricultural diversification through minimizing crop land under traditional foodgrains and its consequent shift into the various high value crops and market-oriented non-food crops such as fruits, vegetables and spices are favourably available in almost the areas of the State. However, the concerned options seem to be largely available in high and middle hill areas while low hill areas are possessing the advantages of using available land largely under the production of certain cereals, pulses and oilseeds rather to concentrate in growing fruits, vegetable and spices on a mass level.

INCOME AND EMPLOYMENT PERSPECTIVES IN AGRICULTURAL DIVERSIFICATION:

Although initiating agricultural diversification would prove as an important measure for improving livelihood situation of farm households and the creation of additional employment opportunities but at the same time, it would be a costly affair for farming households, especially those for tiny size of farm holders. Since the per hectare aggregate input cost for undertaking the production of high value crops was around two to six folds higher as compared to the foodgrains. Expenditure involved in the purchase of various inputs like plants, seeds, fertilizers, hiring of labours and marketing of produced happened to be the major heads of cost which

together accounted to 75 per cent share in the total cost of cultivation. Harvesting, packing and transportation are the main cost involved in fruit cultivation while hiring of labours and animals for ploughing and purchase of seeds accounted the main heads of cost of foodgrain cultivation. Per hectare aggregate input cost of farming foodgrains and high value crops together varied from Rs.3117 in low hill area to Rs.6095 in high hill areas. In case of various cereals, per hectare cost of cultivation stands highest for sawan followed by wheat and paddy with a marginal variations prevailing across different holding sizes and in different areas.

Cost of cultivation stands highest for growing spices followed by fruits, off-season vegetables, oilseeds and foodgrains in almost the geographical locations. In fact opting for growing vegetables, fruits and foodgrains in high hill areas is a much more costly affair as compared to low and middle hill areas. While per unit cost of cultivation of spices and oilseeds comes relatively higher in middle hill areas as compared to remaining areas. Also the farmers have to bear fairly higher per hectare production cost for oilseeds as compared to both cereals and foodgrain crops but around ten times less than the per hectare cost of spices. However, per hectare cost of cultivation of foodgrains was 18 times lower as compared to growing spices, 7 times lower to fruits, and three and half times lower as compared to vegetables.

Plantation of fruits has been recognised to be second most costly activity after the cultivation of spices in the overall farming system. Among different fruits, per hectare cost of production stands at highest level of Rs.13.36 thousand for apple. Harvesting and packing together are noted to be the major heads of costs of almost all the fruits. Its share accounted for over 50 per cent in the total cost of production of fruits. Similarly, in terms of growing various vegetables, the per hectare cost stands highest at Rs.8086 for potato to lowest at Rs.4317 for cabbage. However, the growers of different vegetables, especially potato and onion have to bear a major cost of production in purchasing seeds and plants of concerned vegetables. Though, undertaking the production of off-season vegetables is reported to be less cost effective as compared to go in favour of growing different fruits for every size of farms especially, tiny farms.

The gross income as well as net returns per hectare of land in the cultivation of foodgrain crops has been revealed at a very low level as compared to various high value crops in each of the geographical locations. In comparison to foodgrains, per hectare net income being derived from the cultivation of spices accounted as high as 9 folds, followed by four-folds for fruits, three-folds for vegetables and 59 per cent for oilseeds in high hill areas but the concerned differences relatively less in both middle and low hill areas. However, the value of net returns per hectare for almost the high value crops, except fruits have been recognised relatively at lower level in high hill areas as compared to middle and low hill areas. This is

largely due to much higher level of production cost involved in growing different crops in former areas than in latter areas. Otherwise the gross returns per hectare being originated from all the high value crops in high hill areas stand much higher as compared to remaining areas. The middle and low hill areas have been achieving relatively higher per hectare gross returns as compared to high hill areas in case of growing merely foodgrain crops.

Among the various fruits grown in different areas the highest income generation potentials have been recognised in undertaking the plantation of apple and peaches in high and middle hill areas and mango and litchi in low hill areas. Among the various vegetables, the cultivation of onion followed by potato seems to be a most profitable farming options as compared to growing other vegetables in each of the geographical locations. Also, growing of both potato and onion seems to be more beneficial activity as compared to growing lahi and several other oilseeds and fruits such as pears and plums in the state. Further the pattern of per hectare income generation from growing different food and non-food crops together is seen negatively related with the size classes of farms. And the tiny farm groups of households are deriving comparatively higher per hectare income as compared to upper and medium farm holders in growing of almost the high value crops, especially fruits and vegetables.

On an average a farm household is in a position to generate an annual income of around Rs.7921 from undertaking the farming together of food and non-food crops, though it varies marginally among different geographical locations. Providing 68 per cent arable land under the production of foodgrains has been contributing a share of only 44 per cent while allocating remaining 32 per cent arable land under various high value crops is contributing 56 per cent share in the gross income of farm households. It proves that providing increasing initiatives towards bringing additional arable land from former crops to latter one, especially under fruits and off-season vegetables could be the most important option for maximizing per household income in different areas especially in high and middle hill areas.

The analysis also shows that the proportion of arable land as allocated under different high value crops together has been positively related to the size categories of farms while the pattern of deriving net income per hectare of land from growing concerned crops has been negatively related to the size of farms. Also the tiny farm holders are generating significantly much higher per hectare income than the upper farm holders despite the fact that they have been allocating relatively smaller part of arable land as compared to upper farm holders under the production of various high value crops. Due to the involvement of a fairly high cost of production involved in opting for undertaking the production of various high value crops the farming communities in general and tiny farm holders in particular have been preferring to undertake the cultivation of tradition food crops rather than to opt for growing of certain high

value crops on their farms. Because the prevailing poor economic condition of most farmers, especially in inaccessible areas of middle and high hills is restricting them to bear such a high production cost involved in growing various high value crops.

Initiating agricultural diversification would not only prove as an important measure for enhancing the per hectare productivity but its contribution has also been proved in creating additional and productive employment opportunities since the cultivation of various high value crops have proved more labour intensive as compared to traditional crops. Number of workers employed per hectare in growing of foodgrains accounted only 6 as against 16 and 23 workers in growing of fruits and vegetables respectively. However the potential of generating employment opportunities through undergoing the production of vegetables seems to be fairly larger in low hill areas followed by middle and high hill areas. But the per hectare worker employed in cultivation of fruits is much higher in high hills areas as compared to middle and low hill areas. Also growing of both fruits and vegetables require employing much higher per hectare women workers as compared to the cultivation of foodgrains in each of the geographical locations.

Further it revealed that using one hectare land under the production of food and non-food crops together have the potential to provide 310 mandays employment; consisting relatively much higher at 556 days under the production of vegetables followed by 475 days for fruits as against only 233 days in opting for foodgrains production. Across the different geographical locations, the generation of employment per hectare in undertaking the farming of food and non-food crops together is noted fairly higher in high hill areas followed by middle and low hill areas. In comparison to the cultivation of foodgrains, growing of both fruits and vegetables have been providing almost little over two times higher mandays employment in each high and middle hill areas while 36 per cent in the production of fruits and little over two folds in vegetables in low hill areas. However in each geographical locations, per hectare mandays employment for women have been recognised relatively higher as compared to men in undertaking the foodgrain production.

The labour requirement for undertaking different farming operations both in growing of food and non-food crops is mostly being met out through employing the available workforce with the farm households across the different geographical locations. Merely 10 per cent of farm employment is provided by hired labourers, which stands highest at 20.21 per cent in plantation of fruits to around 9 per cent in growing of vegetables and a little over 7 per cent in foodgrains production. However, the share of hired workers to total workers employed in undertaking both foodgrains and non-foodgrains productions is noted comparatively higher in low hill areas as compared to remaining areas.

On an average a worker engaged in cultivation is in a position to earn Rs.1100 per annum, with a little level of variations existing across different areas. However, using one hectare lands under the production of foodgrains have been providing relatively higher per worker earnings as compared to growing of both fruits and vegetables. But per worker earning in growing of both fruits and vegetables accounted comparatively much higher than that of food crops in case of the middle and high hill areas while reverse is the situation emerging in low hill areas. Also the pattern of average earnings per worker in undertaking the farming of both traditional foodgrain crops and high value crops like fruits and vegetables are positively related with the size categories of farms. Under the existing circumstances the emerging cropping pattern indicates a shift in the production of fruits in high hill areas, vegetables alongwith some fruits in middle hill areas and oilseeds and major foodgrains such as paddy and wheat in low hill areas would be the most alternative options for increasing the livelihood of farming households and providing productive employment to the rural labourforce in respective areas.

PATTERN AND ARRANGEMENTS OF MARKETING:

The farming households in the state are hardly generating any surplus production of foodgrains. A significant level of food scarcity has been highly prevailing in different geographical locations, especially in relation to staple food such as paddy and wheat in high and middle hill areas. Even in agriculturally highly prosperous low hill areas a maximum of little over one third proportion of farm households those which are owning above two hectare size of farms are in a position to generate some surplus of cereals that too paddy and wheat crops only. Rather more alarming situation in terms of food scarcity has been emerging in high hill areas where the proportion of farm households reported to have been generating insufficient foodgrains constituted to over 98 per cent. In fact only less than one per cent households are noted generating surplus production of paddy while the production of wheat has been reported much below the level of consumption requirement of farm households. However, the situation of food security in middle hill areas seems to be slightly better than in high hill areas where 7 per cent farm households have been generating the surplus of foodgrains. In all a major quantity of over 78 per cent of the foodgrain production is retained by the farmers for the purpose of their self-consumption and using it as seeds.

However, the nature of undergoing the production of various non-food crops seems to be largely based on its demand consideration in the sense that 99.91 per cent of non-food production of sugarcane, 92 per cent fruits and 77 per cent vegetables are sold out in the market. Per household volume of foodgrains sold out in the market averages to 220 kgs, which

stands highest at 654 kgs. in low hill areas as against only 60 kgs. in middle and 32 kgs. in high hill areas. On the other hand, per household sale of both fruits and vegetables accounted highest at 10.99 qtls. and 592 qtls. respectively in high hill areas while it is lowest for both the crops in low hill areas; 182 kgs. for fruits and 44 kgs. for vegetables. Per household average size of fruits marketed constitute highest for peaches followed apple which again is highest from high hill areas followed by middle hill areas. Similarly, among different vegetables which are grown in different sample areas, per household marketable surplus has been reported fairly high at 285 kgs. for potato followed by 64 kgs. for onion and lowest at 9 kgs. for tomato.

There seems to be a very high positive relationship between the size of holdings and per household quantity of production, sale and consumption of various farm produce in sample areas. In the bottom farm groups the proportionate sale to gross production has been estimated highest at 91 per cent for fruits to lowest at 14 per cent for foodgrains while it stands highest in case of other non-food crops for both medium and upper farm groups. Also the pattern of generating marketable surplus, in terms of per household quantum of various cereals, has been positively related to the size categories of farm holdings.

The farming communities in different geographical locations have been disposing their farm produced largely through pre-harvest contractors and wholesalers. As over 90 per cent of food and non-food crops is seen sold-out by the farmers through contractors and wholesalers as against 9 per cent within their villages, little over 6 per cent directly to the consumers and 3 per cent to the retail shopkeepers. However, the marketing of various foodgrains and oilseeds is mainly taking place within the villages of concerned farmers. On the other, a major proportion of fruits, vegetables and spices is sold out through middlemen as contractors and wholesalers; such marketing arrangements are mainly prevalent in high hill areas. The proportion of crops sold out under concerned arrangements reaches as high as over 98 per cent for fruits, 90 per cent for spices and 88 per cent for vegetables.

The selling of various farm produce through wholesalers and contractors is benefiting the traders rather than the farming households. But the selling of fruits and vegetables through concerned channels of marketing is quite popular in most of the areas for the past several generations. Due to inadequately developed inefficient marketing arrangements and network in different areas, especially in high and middle hill areas the farmers are forced to adopt concerned channel of marketing for disposal of various farm produced. It has also been observed that farmers having larger orchards are not only involved in the production of fruits but they are equally involved in its marketing. The small growers are usually selling their fruits through these large growers under the pre-arrangement system of marketing.

Over and above inadequately developed marketing facilities in different locations have been directly adversely effecting the participation of farmer in opting for growing various high value crops, especially fruits and vegetables. Lacking realization of reasonable prices for various farm produce and inaccessibility to transport facility, monopoly of middlemen in fixation of prices and lacking facilities of storage, packing materials and grading are some additional problems being faced in selling of different farm produce. A very high proportion of 57 per cent farmers, ranging lowest from 53 per cent in high hill areas to highest at 65 per cent in low hill areas complained that they hardly obtain reasonable prices for their farm produce. Lacking access to transport facilities have been noted as the second most important constraint arising in marketing of the farm produce of over one third proportion of farmers, though the respective proportion of farmers constituted highest at 44 per cent in high hill areas. In fact around one-fourth proportion of farmers have to cover over 10 kms. to reach the nearest marketing centre. Undertaking the initiatives for controlling and fixation of prices of various high value crops on the pattern of practices undertaken for some foodgrains, formation of co-operative Societies of farmers, establishment of marketing centres in the form of sub-mandies in main fruit and vegetable growing areas, providing subsidy on the cost of transportation of farm produced for their selling on the pattern as provided for selling of industrial produced and the establishment of Government procurement centres and cold storage and godowns in different geographical locations are some of the important measures which should be taken for improving the marketing efficiency for various farm produce and influencing the farming communities to maximize the production of various high value crops.

PERSPECTIVES AND PLANNING FOR AGRICULTURAL DIVERSIFICATION:

Almost all the farm households in different areas, irrespective of the size of land they own are involved in the production of various high value crops especially fruits and vegetables. However, the proportion of households involved in growing concerned crops for commercial purposes accounted to around 55 per cent. Among them a majority of over 43 per cent farmers were motivated by factors such as suitability of land, and certain areas specific comparative advantages available to opt for undertaking the farming of these crops. The motive of deriving comparatively higher per hectare income through using their land under the production of various niche based high value crops rather than traditional food crops have influenced a second highest proportion of around 40 per cent farmers while growing of certain high value crops is the traditional occupation of another 30 per cent farm households which are largely concentrated in high hill areas.

In fact, a little over one-third proportion of farm households are planning to add at least some cultivated land area under high value crops or to diversify their farming system through introducing certain new high value crops in the farming system. In the process of initiating agricultural diversification in this manner it is expected that on an average a farm household would be in a position to add another 0.12 hectare arable land with the presently used area under the production certain high value crops. However, the pattern of expansion in area under various high value crops of farm households is largely determining by the availability of the size of cultivated land with them. The size of land to be increased under the changed pattern is expected to be highest for growing fruits followed by herbs, spices, floriculture and vegetables. On an average a farm household will require an amount of Rs.6903 for initiating cultivation of various proposed crops on the additional per household land area of 0.12 hectare; though the concerned cost will vary for different crops. Providing external support in terms of financial assistance at the initiation of growing various high value crops, testing of soils and technological know-how in specific to growing new crops and ensuring marketing facilities for selling the produces would be the additional measured to maximize the participation of different farm holders for undertaking the expansion in land area under various high value crops.

Availability of limited size of arable land area, lacking initiatives from the part of different Government Departments to motivate farmers for undertaking crop diversification and lacking proper marketing facilities for selling the farm produce are noted as the prominent constraints behind a very high proportion of over 62 per cent farm households, comprising 70 per cent in high hills, 59 per cent in middle hills and 58 per cent in low hill areas are still involved in using their cultivated land under the production of various tradition foodgrain crops and are no way making any planning for undertaking shift of any part of their land towards the production of high value crops. Involvement of high production cost and lacking access to improved variety seeds and plants of required crops and the facilities of irrigation etc. have been noted as another important aspects which are limiting the willingness of around one third proportion of farmers in opting to undertake changes in their farming system.

Emerging poor economic conditions of farm households have also been largely restricting them for initiating expansion in land area under various high value crops especially in growing of fruit trees. Because the fruit trees require four to six years to develop for bearing fruits and providing incomes. Therefore shifting land from the production of foodgrains to the plantation of fruits would initially mean hardship for marginal farmers. In this context, the concerned opportunity cost of growing fruit trees on the foodgrain grown areas could be easily met out through adopting inter-cropping in between the fruit trees. The awareness of such option of undertaking inter-cropping may be developed among the farming communities so as

to minimize the opportunity cost of using land under the plantation of fruits trees. The vale of production will, of course be nearly 30 per cent to 50 per cent lower than while cultivating certain crops without fruit trees. In fact around 30 per cent of the sample farmers are presently involved in undertaking inter- cropping in the fruit grown areas through growing of various cereals, oilseeds, pulses, vegetables and spices. Undertaking inter-cropping through growing of oilseeds, especially soyabean in high hill areas and off-season vegetables in both middle and low hill areas, have been identified economically most beneficial option by the present study.

THE POLICY RECOMMENDATIONS:

It has been well recognised that most of the areas in Uttaranchal have been gifted with various advantages and opportunities by the nature for opting the utilization of available arable land under the production of wide ranging traditional food-crops and high value non-food crops. At the same time the potentials for initiating agricultural diversification through minimizing the use of land under the traditional low value food crops and its subsequent shift into the production of various high value crops and market oriented non-food crops such as fruits, off-season vegetables, oilseeds and spices, thereby to maximize per hectare and per household income are favourably available in its different areas. Both per hectare productivity and the value of net income being originated from the production every high value crops, especially most market oriented crops such as fruits and off-season vegetables have been witnessed remarkably many-folds higher as compared to opting the farming of various traditional crops. In fact the elasticity of providing gainful employment opportunities with fairly larger per worker productivity and earnings have been well recognized in opting to confine on farming of former categories of crops as compared to latter one. However, the options and opportunities in favour of undergoing agricultural diversification have been recognized largely available in high hill areas followed by middle hill areas while the low hill areas have the options for using available arable land in growing of certain cereals, pulses and oilseeds rather than to concentrate in growing of fruits, vegetables and spices on a mass level. Various fruits which are being grown with achieving a very high level of per hectare productivity in high and middle hill areas can not be grown elsewhere including in low hill areas of Uttaranchal.

In fact, the farming communities in different geographical locations, irrespective of the size of cultivated land they are possessing, are well aware about using their limited available arable land under the most beneficial options of cropping system which option can maximize the per hectare net income and use of labour. It is, therefore, the area under various tradition foodgrains, even in case of major food crops such as paddy and wheat, which is consistently declining and its increasing shift under the production of various high value crops, especially

fruits, off-season vegetables and spices across the different farm size continuum and in different areas of the State has been well demonstrated. However, even after knowing such a very high economic advantages that can be achieved through using available arable land under the production of various high value crops instead of using it under the production of traditional foodgrain crops a very high proportion of nearly half of farm households, especially in high and middle hill areas have been practicing to undertake the farming system dominated by latter categories of crops. It is mainly due to the involvement of relatively high cultivation cost and the inability of farmers to meet out such level of costs due to their poor economic conditions and inaccessibility situation arising in the availability of various inputs such as seeds and plants and technological know-how in opting for growing of certain high value crops, and the inadequately developed marketing network for selling of farm produces and lacking initiatives from the part of any Government Departments to motivate farmers for changing cropping system, etc.

There is a need to initiate for developing a concrete and comprehensive planning approach to motivate the farming communities for favour of harnessing given natural advantages and niche based opportunities by way of opting the utilization of available arable land under the production of various high value crops through minimizing land under the production of traditional food crops so as the livelihood situation of marginal farmers could be strengthened and the productive employment opportunities for increasing labourforce can be generated to a certain level. In this context following policy measures to be initiated:

- (i) Initiating agricultural diversification in hilly areas of Uttaranchal should aim at maximizing per household income and productive employment opportunities through (a) a shift in the pattern of the use of land already under cultivation; (b) greater emphasis on using available land under the various niche based high value crops; (c) productive use of deforested land; and (d) development of grasslands and pastures to support a more productive animal husbandry sector.
- (ii) It is necessary to provide easy access to support services, such as, seeds and plants, fertilizers, production techniques, improved agricultural devices and methods and marketing infrastructure in order to minimise the risks involved in the shift from food - centered subsistence production to niche-based commercial production.
- (iii) It would be desirable to use most of the less fertile, unirrigated and single-cropped land for plantation of different fruits, herbs and off-season vegetables such as potato depending on the feasibility and suitability of the land, i.e. according to topographical

and agro-climatic conditions while the irrigated land confined in valley and low hill areas could be used for growing various cereal crops and vegetables.

- (iv) In view of the marketing problems, organizing the growers of different high value crops into co-operative societies and developing of mandies and marketing centres in diversified manner in specific to the certain crops are grown in particular areas would be a necessary and effective step for boosting up the development of various high value crops.
- (v) Procurement Centre and cold storage and godowns in different geographical locations are some of the important measures which should be taken for improving marketing efficiency for various farm produce and influencing the farming communities to maximize the production of various high value crops.
- (vi) A most desirable measure for improving marketing network and its efficiency for disposing different high value crops would be the expansion of various necessary marketing infrastructural facilities. The procurement centres and sub-mandies and cold storages for storing various fruits could be established in Nathuwakhan-Ramgarh catchment area of Nainital, Chaubatia-Tarikheth catchment in Almora, Mansoorie-Tehri belt Tehri-Garhwal, Munsiaiy-Bona belt of Pithoragarh and Gangotry Valley in Uttarkashi. Similarly, the purchasing centres and cold storages for facilitating the storage of off-season vegetables and spices should be developed in Litee-Shama-Karmi catchment area of Bageshwar, Someshwar-Dwarahat belt of Almora, Narendra Nagar in Tehri, Dhanaulti catchment area of Tehri Garhwal and Khusiakatauli-Garampani area of Nainital. At the same time two large cold storages one each in Garhwal and Kumaun division should also be established so that the various high value crops stored in different godowns and cold storage may be undertaken into these large cold storages.
- (vii) The provision of providing subsidy on the cost of transportation on carrying out different high value crops from their production locations to the nearest available facility of marketing should also be introduced as already applicable in the case of industrial products.
- (viii) A policy of fixation of purchase prices in favour of major fruits and vegetables before their harvesting in each crop seasons and the appropriate measures for ensuring its timely communication to farming communities should also be introduced.
- (ix) Considering the low income available with the farming households they are unable to bear the opportunity cost of growing fruits on their farms. In this context concerned

opportunity cost of growing fruit trees on the fruit grown areas could be easily met out through adopting inter cropping in between the fruit trees. The awareness of such option of undertaking inter-cropping may be developed among the farming communities so as to minimize opportunity cost.

- (x) Various high value commercial crops such as oilseeds, especially soyabean, vegetables and spices have already been identified to be used for inter-cropping in different areas which may be communicated to the farmers in concerned areas.
- (xi) In addition, the ongoing employment programmes run by the Central and State Government, especially its Employment Assurance Schemes which aim to provide income to poor households through wage employment, could be applied, with suitable modifications, if necessary, to provide food security to farmers who are shifting to non-food crops. Further, shifting to cultivation of non-food crops means that the public distribution system should be strengthened to ensure that adequate quantities of food-grains are available at affordable prices.
- (xii) Development of animal husbandry would require increasing emphasis on developing different types of fodder on the available pasture and deforested land area on a community basis, establishing extension centres for veterinary services, and bringing about improvements in the quality of animals by introducing better breeds and distributing them among farm households over a large area.
- (xiii) Keeping into account the availability of small size of holdings among the farm households the issues linked to the development of pasture land and cultivable land and permanent fallow land which account for nearly 18 per cent of the geographical areas, even much higher than the cultivated land area, have to be provided a significant importance in the context to maximize gross cultivated land area. In this context, there is an urgent need to classify above land into different land categories based on quality and suitability for different uses; e.g., for wood and non-wood forest products, plantation of fruit trees, for medicinal herbs, growing of tea plantations and so on and then the use of this land should be maximized for most economical purposes with providing due priority to bring more land under the forest cover. This is again essential for regeneration and protecting the environment as forest resources also indirectly help in increasing farm productivity and animal husbandry sector.

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